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Volume II, Annex B

PROCEDURES FOR ECONOMIC ANALYSIS

Final Report Submitted to the

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

In Partial Fullfillment of

CONTRACT NO. AID/EA-C-1099

Submitted by

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PROCEDURES FOR ECONOMIC ANALYSIS

The indices for estimating the economic feasibility of the proposed improvements were computed with the assistance of a computer program which had been adapted for this purpose by Professor Richard Phillips, Department of Economics, Kansas State University, Manhattan, Kansas. This appendix contains a users guide and description of the program.

The annex contains five parts. These are: 1) a description of the program and preparation of input for computer use, 2) a user guide to program options, the input sequence, and input formats, 3) a listing of the problem input, 4) a reproduction of the problem output, and 5) a listing of the program deck. A complete set of program cards as well as a listing of the program cards which were used to conduct the economic analysis for the proposed improvements to BRIS are attached. The program is written in FORTRAN IV language and can be used on many of the computers which are located in Manila.

The following references contain guidelines for preparing data in suitable form for economic evaluation of proposed irrigation projects:

1. Asian Development Bank, Regional Workshop on Water Management, Asian Development Bank, 1973, pp 21-62.

2. Gittinger, J. Price, Economic Analysis of Agricultural Projects, Johns Hopkins University Press, Baltimore, 1972, pp vii and 221.

3. Kulp, Earl M., Designing and Managing Basic Agricultural Programs, International Development Institute, Indiana University, Bloomington, 1977, pp xxiii and 279.

4. Bergmann, Helmuth and Jean-Marc Boussard, Guide to the Economic Evaluation of Irrigation Projects (Revised Version), Organization for Economic Co-operation and Development, Paris, 1976, p 257.

PART I

DESCRIPTION OF PROGRAM AND PREPARATION OF INPUT FOR COMPUTER USE

The computer program used for calculating the internal rate of return, social rate of return, and financial rate of return is written in FORTRAN IV and uses an algorithm after the method developed by Lawrence Fisher of the University of Chicago. With minor modifications for compatibility with the operating system, the program can be used on any computer with the capability for handling this kind of program.

The computer program is reproduced in full in Section IX-E. The explanatory comments (identified by the letter C in column 1) are the documentation for the program. They are not necessary to the operation of the program, and may be omitted from the working deck if desired.

The schedules of capital investment, revenue and operating expense over the planning period for each project to be included in the computer run are read and input to the program in up to nine fields of eight digits each. Control cards are used to identify the data in each field and to specify how these data are to be combined for the computations and the tabular printout for each project. A card with a number 9999 appearing in columns 1-4 is used to separate the data for one project from that of the next to be included in the same run.

The general order for the card deck to run the internal rates of return by computer is as follows:

1. The call and execution instructions in the proper order for the operating system on the computer to be used.

2. The program deck.

3. The entry card for the operating system on the computer to be used.

4. The units card, specifying the monetary unit in which the data are provided (see below).

5. The discounts card, specifying the number of times the input data are to be discounted per year (see below).

6. The starting period and benefit-cost ratio option card (see below).

7. Data sets for all of the projects which are to be included in the run (see below).

8. Program termination cards required by the operating system on the computer to be used.

The units card specifies the monetary unit in which the data are provided (all data for all projects included in the same run must be in the same unit). The unit is specified as an eight-character field, starting in column 10. Examples of monetary units which might be used are pesos, P1000, dollars, $US1000, pounds, 1000 yen.

The discounts card is used to call up the program option to compute the annual internal rate of return on the basis of more (or less) than one discounting per year. For example, if quarterly discounting is desired, the number 4.0 is specified. For the usual annual discounting, the number 1.0 is specified. The information to be inserted on this card is the number of discounts (compoundings) per year, with the decimal point in column 40. For annual discounting, 1.0 goes in columns 39-41.

The starting period option is used when the first year of data may not be period zero (discount factor of 1.0), and instructs the program to determine the starting year for each project from the input data for that project. The starting period and benefit-cost ratio option card contains the phrase starting in column 1 "BEGINNING YEAR IS VARIABLE." If this option is not desired, these columns of the option card should be left blank, and the program will start the discounting for all projects in year 0, no matter what starting year is given with the data. (The option is useful for handling sunken investments, for clarity in presenting the results, and for obtaining the proper discounted present values; however, neither the benefit-cost ratios nor the starting year so long as the investment schedule and the net benefits schedule for the project are kept in constant alignment.)

The benefit-cost ratio option is used when benefit-cost ratios are desired with the computer output. To activate this option, the number (1) is placed in column 40 of the starting period and benefit-cost ratio option card. The option card should then be immediately followed by a card of discount rates in six fields of six columns each with the first field starting in column 1. The discount rates may be listed in any order, e.g., ascending or descending, and will be shown in the printout in the same order as listed on the input card. If this information is not desired, column 40 of the starting year and benefit-cost ratio option card should be left blank and the card containing the discount rates should be omitted. The program will then omit the computation and printing of benefit-cost ratios for all projects included in the run.

If neither the starting point nor the benefit-cost ratio options are desired, a blank card should be used in lieu of this option card.

The data set for each project to be included in the computer run is to include the following in sequence:

1. A control card to identify the input data, to instruct the program in how to combine these data, to specify what rate of return is to be computed, to specify the number of alternatives to be analyzed, to specify whether to punch output cards, and to list the discount rate for the net present value option.

2. Two table heading cards to identify the project.

3. Two column header cards to identify the input columns.

4. The footnote card for the base case.

5. The identifying footnote card and the input column scaler card for each alternative.

6. One input data card for each period included in planning horizon for the project.

7. One nines card containing the number of 9999 in columns 1-4 to indicate the end of data for the project.

The data control card for the project instructs the program on how to combine the various schedules included as input. For purposes of the computations and the computer output; the input data are combined into four schedules by the program, in the following order:

1. Investment for facilities and equipment
2. Working capital requirements
3. Revenue and other benefits
4. Operating expenses and negative benefits

The program will combine consecutive input schedules into each of these four schedules, depending upon the instructions provided in the first four columns of the control card. For example, if the control card contains in the first four columns the digits 3123, the program will combine the first three columns of input data to get the total investment schedule for facilities and equipment, the next one field of input data to get the schedule of total working capital required, the next two fields of input data to get the schedule of total revenue and benefits and the last three fields of input data to get the schedule of total operating expense and negative benefits. If the control card contains the digits 2222 in the first four columns, then the program will combine in sequence two fields of input data to get each of the four schedules needed for the computations. This section of the control card must be completed, even if only four schedules of input data are provided. In this case the digits in columns 1-4 of the control card would be 1111.

The fifth column on this same control card is used to specify the type of rate of return to be computed from the data submitted. The codes are as follows;

1. = internal rate of return
2 = direct rate of return
3 = associated rate of return
4 = social rate of return
5 = comparative rate of return
6 = financial rate of return
7 = net present value at specified discount rate

The two table heading cards each contain up to 80 alphameric characters to identify and describe the project, and will be printed as the second and third lines of the output table for that project. Phases centered in the 80 columns will be centered over the output table. There must be two of these cards, even if one is blank.

The input column header cards are used to identify the columns of data provided. They contain alphameric characters to be centered in fields of 12 digits each, starting with the word "YEAR" or "PERIOD". The two cards are required to cover the 132 spaces on the computer output (80 on the first card plus 52 on the second).

The base case footnote card contains up to 80 alphameric characters starting on column 1, and is used to further describe the base case (as distinguished from the alternatives to be analyzed).

The identifying footnote card for each alternative is used to describe that alternative in specific terms as it will appear on the printed output.

The input column scaler card for each alternative is used to designate the multiplier (e.g., 1.0372) required on one or more of the input columns to change the data from base case so that they will represent that alternative.

One input data card is to be provided for each accounting period over the planning horizon for the project. They should be arranged in proper sequence, from the first to the last period in the planning horizon.

Columns 1-4 The year number in the planning period to which the input data applies, right justified. For example, the first card might contain -2 in columns 3-4, the second -1 in columns 3-4, the third 0 in column 4, the fourth 1 in column 4, and so on until the last with 50 in columns 3-4. If discounting is to be done more often than once per year, then a separate data card must be provided for each discounting period (e.g., four cards for each year if discounting is to be done quarterly).

Columns 5-8 The calendar year designation (e.g., 1970) to which the input applies, or if discounting is to be done more than once per year, the seasonal designation (e.g., the Spring quarter of 1972 might be designated 72-S or the wet season of 1975 as 75-W). These columns can be left blank if the calendar year or season designation is not desired in the output table for the project.

Columns 9-16 The input data for the corresponding year (or other period) from the schedule for the first variable (integer or decimal number) right justified. For example, an entry of 15,330 units would be entered as 15330 in columns 12-16 and one of -826 units would be entered as -826 in columns 13-16.

Columns 17-24 The output data for the corresponding year (or other period) from the schedule for the second variable, right justified.

Columns 73-80 The input data for the corresponding year (or other period) from the schedule for the ninth variable, right justified.

If more than nine variables are involved, the total should be reduced to nine by combining two or more of the variables into one (e.g., addition of working capital for inventories to working capital for accounts receivable, so that only the sum is entered) before keypunching is done.

The nines card at the end of the input deck signifies the end of data for the project and must be included after the input for each of the projects inlcuded in the run, including the last project.

The signs for the variables in the input data are taken care of automatically by the program and the control card specifying the method of combining the variables. All variables designated as capital investment (by the first digit on the control card) are treated as capital outlays unless the entry is preceded by -, in which case it is treated as a negative investment (capital inflow). All variables designated as revenue and benefits (by the third digit on the control card) are treated as income unless the entry is preceded by -, in which case it is treated as negative income (operating cost). All variables designated as operating cost and negative benefits (by the fourth digit on the control card) are treated as costs unless the entry is preceded by -, in which case it is treated as a negative cost (operating income).

The input format and outline of all the input cards required for the run are illustrated in the following section.

PART II

USER GUIDE TO PROGRAM OPTIONS, INPUT SEQUENCE AND INPUT FORMATS

IRR FEASIBILITY ANALYSIS PROGRAM WITH OPTIONS

PROFESSOR RICHARD PHILLIPS
DEPARTMENT OF ECONOMICS
KANSAS STATE UNIVERSITY

BASIC ALGORITHM USES THE METHOD OF LAWRENCE FISHER AS PRESENTED IN

THE JOURNAL OF BUSINESS
GRADUATE SCHOOL OF BUSINESS
UNIVERSITY OF CHICAGO
VOLUME 39 NUMBER 1 PART 2
JANUARY 1966 PAGE 116

OPTIONS INCLUDE THE FOLLOWING:

A. TYPE OF ANALYSIS AND OUTPUT FORMAT
   1. INTERNAL RATE OF RETURN (IRR)
   2. DIRECT RATE OF RETURN (DRR)
   3. ASSOCIATED RATE OF RETURN (ARR)
   4. SOCIAL RATE OF RETURN (SRR)
   5. COMPARATIVE RATE OF RETURN (CRR)
   6. FINANCIAL RATE OF RETURN (FRR)
   7. COMPARATIVE NPV AT GIVEN RATE (NPV)

B. NUMBER OF TIMES DISCOUNTED PER YEAR
   (RATES OF RETURN ARE COMPUTED ON EQUIVALENT ANNUAL BASIS)

C. PROVISION FOR SCALING ANY OR ALL INPUT COLUMNS TO ANALYZE ALTERNATIVES (UP TO 40 SCALE CARDS PER PROJECT).

D. OPTIONAL BENEFIT/COST RATIOS AND DISCOUNTED PRESENT VALUES AT UP TO SIX SPECIFIED DISCOUNT RATES.

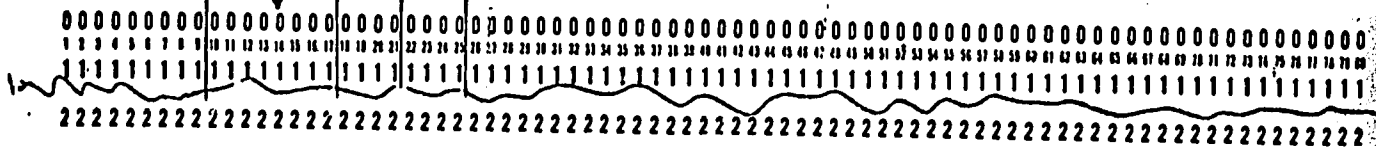
E. OPTIONAL STARTING PERIOD FOR DISCOUNTING SO THAT SUNKEN INVESTMENTS AS WELL AS FUTURE INVESTMENTS AND INCOMES ARE COMPUTED IN EQUIVALENT PRESENT VALUES.

F. COMPLETELY FORMATED OUTPUT TABLES WITH TITLES AND MONETARY UNIT READ IN WITH DATA.

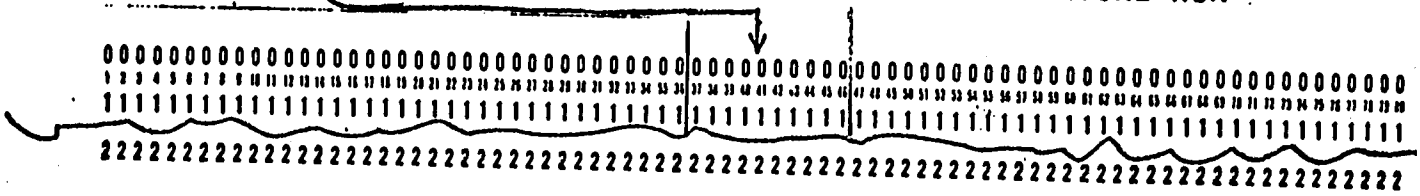
G. OPTION TO PUNCH CARDS OF COMBINED OUTLAY AND NET INCOME SCHEDULES FOR USE IN DEVELOPING PROFORMA STATEMENTS.

STEP ORDER FOR THE PROGRAM INPUT IS AS FOLLOWS:

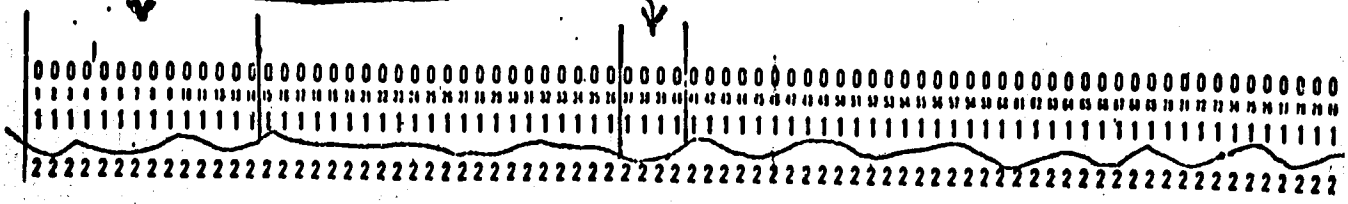
1. READ MONETARY UNIT AND LOGICAL UNITS FOR DATA & OUPTUT
   MONETARY UNIT
   UNIT FROM WHICH INPUT DATA ARE TO BE READ
   UNIT TO WHICH OUTPUT DATA ARE TO BE PLACED
   INSERT MONETARY UNIT AS "DOLLARS", "$1000",ETC.
   IF USING CARDS, INSERT "5" AND "7" FOR LOG. UNITS.
   FORMAT IS 9X,2A4,I4,I4
   THIS STEP IS INCLUDED ONCE FOR THE ENTIRE RUN.



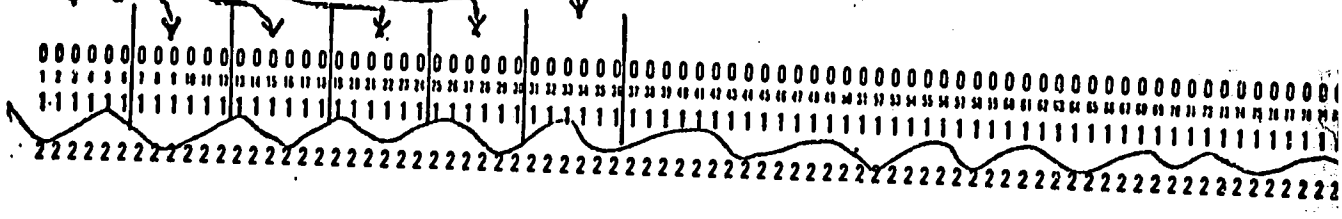
2. READ NUMBER OF DISCOUNTS PER YEAR
   INSERT AS "1.0", "4.0", ETC
   FORMAT IS 36X, F10.0
   THIS STEP IS INCLUDED ONCE FOR THE ENTIRE RUN



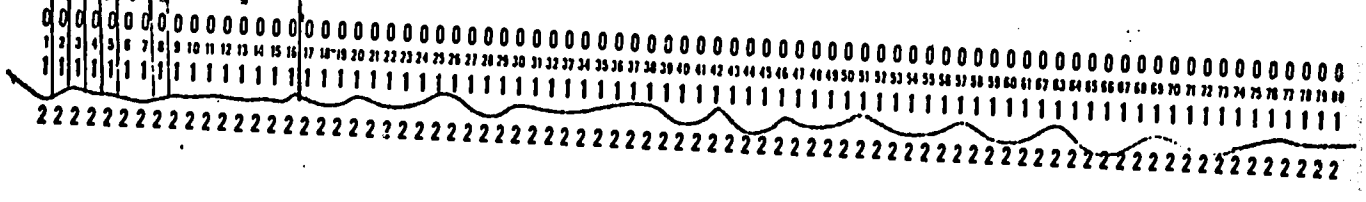
3. READ BEGINNING YEAR VARIABLE AND BENEFIT/COST OPTIONS
   A. TO USE BEGINNING YEAR OPTION, INSERT "BEGINNING YEAR"
      STARTING IN COLUMN 1
      BEGINNING YEAR
   B. TO CALL FOR BENEFIT/COST, INSERT "1" IN COLUMN 40
      BENEFIT/COST OPTION: YES = 1, NO = 0
   C. TO OMIT BOTH OPTIONS, INSERT A BLANK CARD
   FORMAT IS A4, 32X, I4
   THIS STEP IS INCLUDED ONCE FOR THE ENTIRE RUN



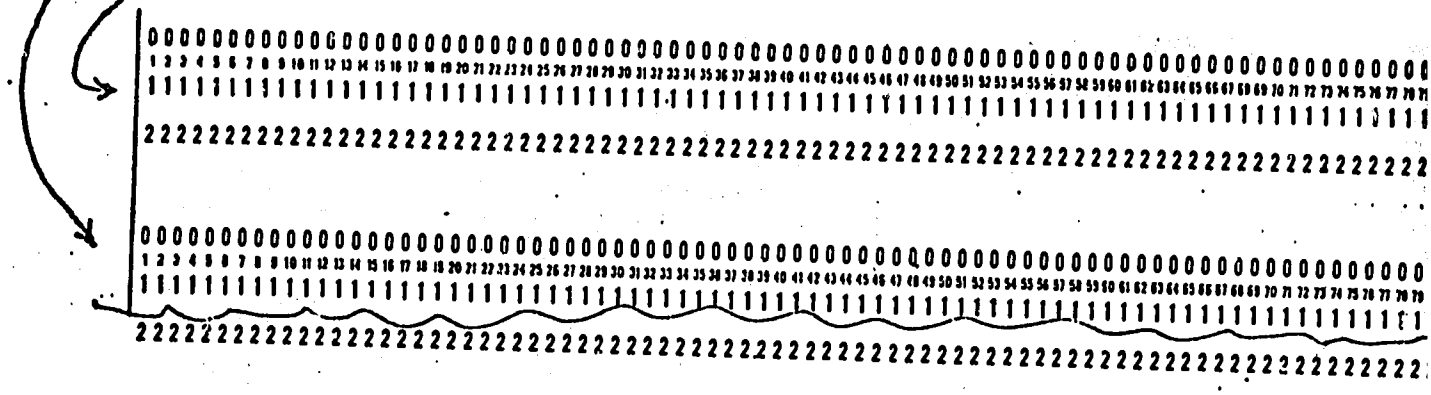
4. IF ORDERED, READ DISCOUNT RATES FOR B/C RATIOS
   1ST DISCOUNT RATE
   2ND DISCOUNT RATE
   3RD DISCOUNT RATE
   4TH DISCOUNT RATE
   5TH DISCOUNT RATE
   6TH DISCOUNT RATE
   ENTER RATES AS DECIMALS (E.G., 10% AS 0.10) IN THE SAME ORDER DESIRED IN PRINTOUT
   FORMAT IS 6F6.5
   THIS STEP IS INCLUDED ONCE FOR THE ENTIRE RUN



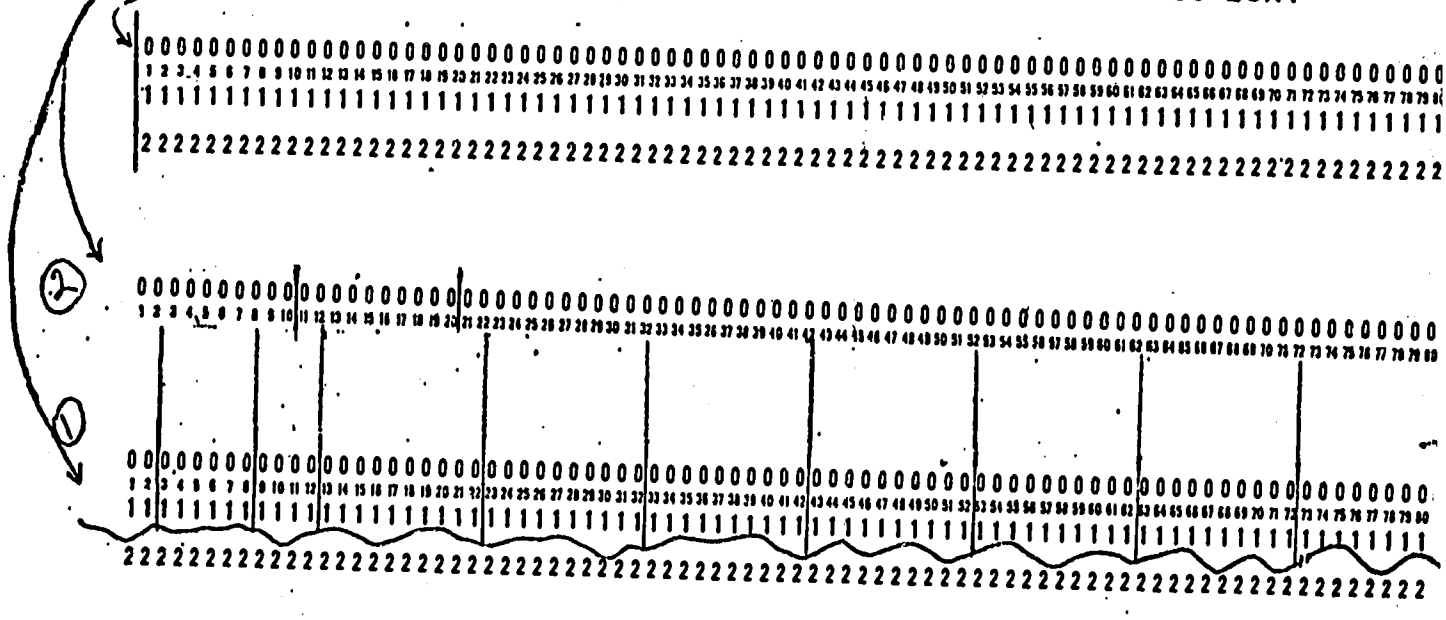
5. READ THE CONTROL CARD FOR THE PROBLEM
   A. NFAC = NUMBER OF COLUMNS OF INVESTMENT OUTLAY DATA
   B. NWC = NUMBER OF COLUMNS OF WORKING CAPITAL DATA
   C. NREV = NUMBER OF COLUMNS OF REVENUE AND INCOME DATA
   D. NEXP = NUMBER OF COLUMNS OF OPERATING EXPENSE DATA
      NOTE: A + B + C + D MUST NOT EXCEED 9
   E. IRRW = TYPE OF ANALYSIS AND OUTPUT FORMAT
      1 = IPR; 2 = DRR; 3 = ARR; 4 = SRR;
      5 = CRR; 6 = FRR; 7 = NPV.
   F. NSCALE = NUMBER OF SCALE CARDS TO READ AND USE
   G. ICARDS = PUNCH CARDS; YES = 1, NO = 0
   H. INT = DISCOUNT RATE TO USE WITH THE NPV OPTION
   FORMAT IS I1,I1,I1,I1,I1,I2,I1,F8.6
   THIS AND THE REMAINING STEPS ARE REPEATED FOR EACH PROBLEM INCLUDED IN THE RUN



6. READ THE TITLE CARDS FOR THE PROBLEM
   1 CARD FOR FIRST LINE OF TITLE, CENTERED IN 80 COLS.
   1 CARD FOR SECOND LINE OF TITLE (OR BLANK CARD)
   FORMAT IS 20A4

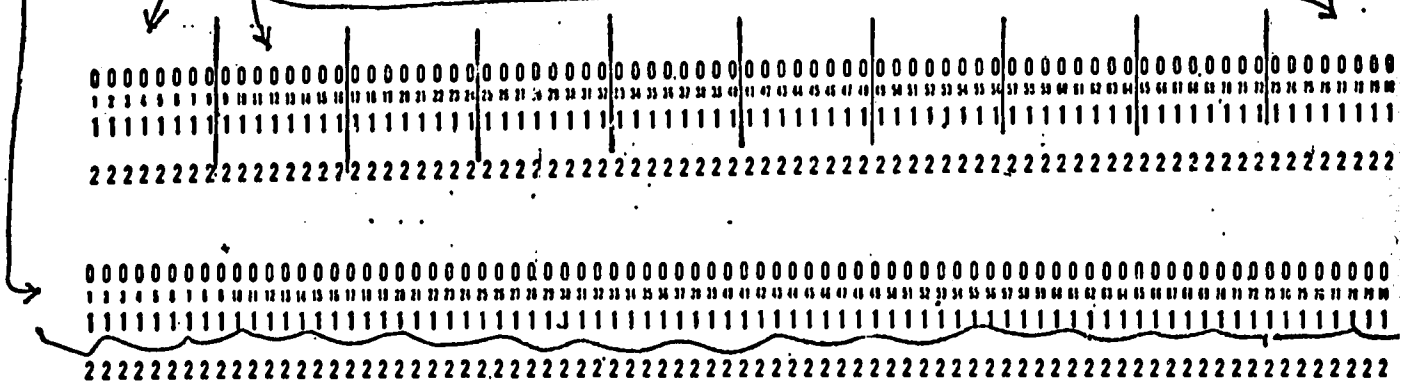


7. READ THE INPUT COLUMN HEADERS AND BASE CASE FOOTNOTE
   A. TWO CARDS FOR 132 COLUMNS, 2X, A6, 4X, 9(A10,2X)
   B. ONE CARD FOR BASE CASE FOOTNOTE. FORMAT IS 20A4

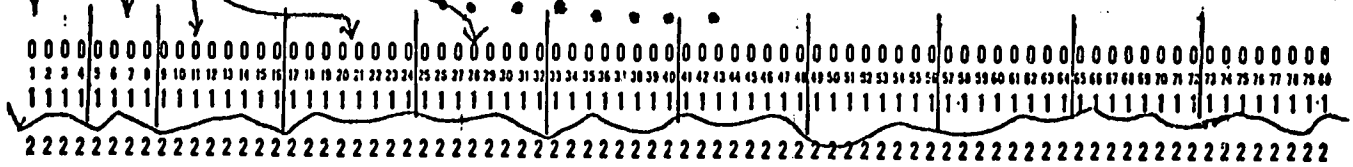


8. IF ORDERED, READ FOOTNOTE AND SCALE CARDS FOR EACH ALT.
(TOTAL NUMBER OF EACH = NSCALE)
ORDER IS ALT. 1, FOOTNOTE, SCALER; ALT. 2, DITTO;

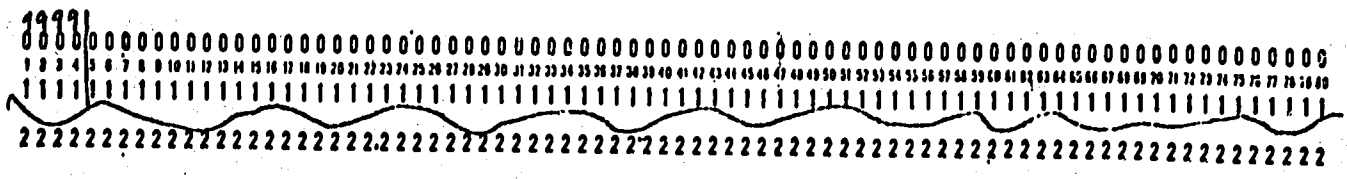
ENTER FOOTNOTE TO IDENTIFY ALTERNATIVE, STARTING IN COLUMN 1
FORMAT IS 20A4
ENTER SCALE FACTORS AS MULTIPLIERS, MATCHING INPUT COLUMNS TO BE SCALED. ENTER "1.0" FOR COLUMNS WHICH ARE NOT SCALED
1ST DATA COLUMN SCALE FACTOR
2ND DATA COLUMN SCALE FACTOR
LAST DATA COLUMN SCALE FACTOR
FORMAT IS 8X, 9F8.4



9. READ THE DATA FOR THE PROBLEM, ONE CARD FOR EACH PERIOD
INO GOES IN THE FIRST FIELD AND INDICATES SEQUENCE.
PERIODS PRIOR TO PRESENT ENTERED AS -3, -2, -1.
IYR GOES IN THE 2ND FIELD, AND IDENTIFIES EACH PERIOD IN THE OUTPUT TABLE AS "1975","1Q75","JA75",
INPUT DATA GO IN THE REMAINING FIELDS AS INDICATED ON THE CONTROL CARD. IF THERE ARE NEGATIVE OUTLAYS, INCOMES OR EXPENSES, INSERT "-" BEFORE FIRST DIGIT. RIGHT JUSTIFY DATA, OR INSERT DECIMAL PT.
FORMAT IS I4, A4, 9F8.0



10. END OF DATA CARD
INSERT "9999" IN FIRST FOUR COLUMNS AT END OF DATA TO SIGNIFY MOVEMENT TO THE NEXT PROBLEM.
THIS CARD MUST BE INSERTED FOR EACH PROBLEM FOR WHICH THE CONTROL CARD IS INSERTED (SEE STEP 5)



PART III

LISTING OF PROBLEM INPUT

```
        PES01000   5   7
                                          1.0
                                           1
0.10  0.11  0.12  0.13  0.14  0.15
51111 50
            NET PETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO
                          BARIT RIVER IRRIGATION SYSTEM
    YEAR     INVST CMP 1 INVST CMP 2 INVST CMP 3 INVST CMP 4 INVST CMP 5 MAINTENA
NACE FRM INC WITHFRM INC WOUT
BASE CASE WITHOUT APPLICATION OF ANY COLUMN SCALARS
 25PERCENT DECREASE IN INVST CMP 1 (ROADS,MNTNCE)
          0.74    1.00    1.00    1.00    1.00    0.80    1.00    1.00
14PERCENT DECREASE IN INVST CMP 1 (FM DITCHES,MNTNCE)
          0.86    1.00    1.00    1.00    1.00    0.92    1.00    1.00
  0PERCENT DECREASE IN INVST CMP 1 (ROADS,FM DITCHES,MTNCE)
          0.60    1.00    1.00    1.00    1.00    0.72    1.00    1.00
  0PERCENT DECREASE IN INVST CMP 1 (RDS FM DITCHES, RED INC WOUT PJT)
          0.60    1.00    1.00    1.00    1.00    0.72    1.00    0.95
   PERCENT REDUCE INC WOUT PROJECT (ADJUST FOR RAINFED LAND)
          1.00    1.00    1.00    1.00    1.00    1.00    1.00    0.95
  11978   6202.   1857.      0.    415.    165.      0.  11030.  11030.
  21979   5319.   1420.      0.    772.    166.    222.  12843.  11747.
  31980   3805.      0.   1397.    124.     53.    409.  14418.  12446.
  41981      0.      0.      0.    124.      0.    513.  15271.  13018.
  51982      0.      0.      0.    124.      0.    513.  16035.  13615.
  61983      0.      0.      0.      0.      0.    513.  16836.  14239.
  71984      0.      0.      0.      0.      0.    513.  17678.  14579.
  81985      0.      0.      0.      0.      0.    513.  18560.  15577.
  91986      0.      0.      0.      0.      0.    513.  19190.  16063.
 101987      0.      0.      0.      0.      0.    513.  19827.  16558.
 111988      0.      0.      0.      0.      0.    513.  20516.  17087.
 121989      0.      0.      0.      0.      0.    513.  21209.  17622.
 131990      0.      0.      0.      0.      0.    513.  21648.  17996.
 141991      0.      0.      0.      0.      0.    513.  22302.  18462.
 151992      0.      0.      0.      0.      0.    513.  22681.  18752.
 161993      0.      0.      0.      0.      0.    513.  23066.  19047.
 171994      0.      0.      0.      0.      0.    513.  23460.  19347.
 181995      0.      0.      0.      0.      0.    513.  23859.  19652.
 191996      0.      0.      0.      0.      0.    513.  23859.  19652.
 201997      0.      0.      0.      0.      0.    513.  23859.  19652.
 211998      0.      0.      0.      0.      0.    513.  23859.  19652.
 221999      0.      0.      0.      0.      0.    513.  23859.  19652.
 232000      0.      0.      0.      0.      0.    513.  23859.  19652.
 242001      0.      0.      0.      0.      0.    513.  23859.  19652.
 252002      0.      0.      0.      0.      0.    513.  23859.  19652.
 262003      0.      0.      0.      0.      0.    513.  23859.  19652.
 272004      0.      0.      0.      0.      0.    513.  23859.  19652.
 282005  -5305.  -1101.   -524.      0.      0.    513.  23859.  19652.
9999
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PART IV

REPRODUCTION OF PROGRAM OUTPUT

SPECIAL EXPLANATIONS OR COMMENTS CONCERNING THIS RUN

UNITS OF MEASURE FOR OUTPUT IS PESO1000

NUMBER OF TIMES DISCOUNTED PER YEAR = 1.00

"BEGINNING YEAR IS VARIABLE" OPTION IS NOT BEING USED

0.10000	0.11000	0.12000	0.13000	0.14000	0.15000

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO BARIT RIVER IRRIGATION SYSTEM

YEAR	INVESTMENT COMPONENT 1	INVESTMENT COMPONENT 2	INVESTMENT COMPONENT 3	INVESTMENT COMPONENT 4	INVESTMENT COMPONENT 5	MAINTENANCE	FARM INCOME WITH PROJECT	FARM INCOME WITHOUT PROJECT
1978	6202.	1657.	0.	415.	165.	0.	11030.	11030.
1979	5319.	1420.	0.	772.	166.	222.	12843.	11747.
1980	3805.	0.	1397.	124.	53.	409.	14418.	12446.
1981	0.	0.	0.	124.	0.	513.	15271.	13018.
1982	0.	0.	0.	124.	0.	513.	16035.	13615.
1983	0.	0.	0.	0.	0.	513.	16836.	14239.
1984	0.	0.	0.	0.	0.	513.	17678.	14579.
1985	0.	0.	0.	0.	0.	513.	18560.	15577.
1986	0.	0.	0.	0.	0.	513.	19190.	16063.
1987	0.	0.	0.	0.	0.	513.	19827.	16558.
1988	0.	0.	0.	0.	0.	513.	20516.	17087.
1989	0.	0.	0.	0.	0.	513.	21209.	17622.
1990	0.	0.	0.	0.	0.	513.	21648.	17996.
1991	0.	0.	0.	0.	0.	513.	22302.	18462.
1992	0.	0.	0.	0.	0.	513.	22681.	18752.
1993	0.	0.	0.	0.	0.	513.	23066.	19047.
1994	0.	0.	0.	0.	0.	513.	23460.	19347.
1995	0.	0.	0.	0.	0.	513.	23859.	19652.
1996	0.	0.	0.	0.	0.	513.	23859.	19652.
1997	0.	0.	0.	0.	0.	513.	23859.	19652.
1998	0.	0.	0.	0.	0.	513.	23859.	19652.
1999	0.	0.	0.	0.	0.	513.	23859.	19652.
2000	0.	0.	0.	0.	0.	513.	23859.	19652.
2001	0.	0.	0.	0.	0.	513.	23859.	19652.
2002	0.	0.	0.	0.	0.	513.	23859.	19652.
2003	0.	0.	0.	0.	0.	513.	23859.	19652.
2004	0.	0.	0.	0.	0.	513.	23859.	19652.
2005	-5305.	-1101.	-524.	0.	0.	513.	23859.	19652.

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO
BARIT RIVER IRRIGATION SYSTEM

INTERNAL RETURN ON TOTAL CAPITAL 11.653 PERCENT

PERIOD NO.	YEAR	INVESTMENT (PESO1000) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (PESO1000) TOTAL REVENUE	OPERATING EXPENSES	NET REVENUE	PRESENT VALUE FACTOR	PRESENT VALUE TOTAL INVESTMENT	PRESENT VALUE NET REVENUE
1	1978	8639.	0.	8639.	11030.	11030.	0.	1.0000	8639.	0.
2	1979	7677.	222.	7899.	12843.	11747.	1096.	0.8956	7075.	982.
3	1980	5379.	409.	5788.	14418.	12446.	1972.	0.8022	4643.	1582.
4	1981	124.	513.	637.	15271.	13018.	2253.	0.7184	458.	1619.
5	1982	124.	513.	637.	16035.	13615.	2420.	0.6435	410.	1557.
6	1983	0.	513.	513.	16836.	14239.	2597.	0.5763	296.	1497.
7	1984	0.	513.	513.	17678.	14579.	3099.	0.5162	265.	1600.
8	1985	0.	513.	513.	18560.	15577.	2983.	0.4623	237.	1379.
9	1986	0.	513.	513.	19190.	16063.	3127.	0.4140	212.	1295.
10	1987	0.	513.	513.	19827.	16558.	3269.	0.3708	190.	1212.
11	1988	0.	513.	513.	20516.	17087.	3429.	0.3321	170.	1139.
12	1989	0.	513.	513.	21209.	17622.	3587.	0.2975	153.	1067.
13	1990	0.	513.	513.	21648.	17996.	3652.	0.2664	137.	973.
14	1991	0.	513.	513.	22302.	18462.	3840.	0.2386	122.	916.
15	1992	0.	513.	513.	22681.	18752.	3929.	0.2137	110.	840.
16	1993	0.	513.	513.	23066.	19047.	4019.	0.1914	98.	769.
17	1994	0.	513.	513.	23460.	19347.	4113.	0.1714	88.	705.
18	1995	0.	513.	513.	23859.	19652.	4207.	0.1535	79.	646.
19	1996	0.	513.	513.	23859.	19652.	4207.	0.1375	71.	579.
20	1997	0.	513.	513.	23859.	19652.	4207.	0.1232	63.	518.
21	1998	0.	513.	513.	23859.	19652.	4207.	0.1103	57.	464.
22	1999	0.	513.	513.	23859.	19652.	4207.	0.0988	51.	416.
23	2000	0.	513.	513.	23859.	19652.	4207.	0.0885	45.	372.
24	2001	0.	513.	513.	23859.	19652.	4207.	0.0793	41.	333.
25	2002	0.	513.	513.	23859.	19652.	4207.	0.0710	36.	299.
26	2003	0.	513.	513.	23859.	19652.	4207.	0.0636	33.	267.
27	2004	0.	513.	513.	23859.	19652.	4207.	0.0569	29.	240.
28	2005	-6930.	513.	-6417.	23859.	19652.	4207.	0.0510	-327.	215.
	TOTAL	15013.	13456.	28469.	579019.	483357.	95662.		23479.	23479.

INTEREST PER CENT	BENEFIT/COST RATIO	PRESENT VALUE IN PESO1000 REVENUE	OUTLAY	BALANCE
10.000	1.137	27403.	24101.	3302.
11.000	1.051	24920.	23718.	1202.
12.000	0.975	22764.	23355.	-592.
13.000	0.907	20882.	23013.	-2131.
14.000	0.848	19233.	22690.	-3458.
15.000	0.794	17780.	22385.	-4605.

ALTERNATIVE:

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO BARIT RIVER IRRIGATION SYSTEM

YEAR	INVESTMENT COMPONENT 1	INVESTMENT COMPONENT 2	INVESTMENT COMPONENT 3	INVESTMENT COMPONENT 4	INVESTMENT COMPONENT 5	MAINTENANCE	FARM INCOME WITH PROJECT	FARM INCOME WITHOUT PROJECT
SCALERS:	0.74	1.00	1.00	1.00	1.00	0.80	1.00	1.00
1978	4589.	1857.	0.	415.	165.	0.	11030.	11030.
1979	3036.	1420.	0.	772.	166.	178.	12843.	11747.
1980	2816.	0.	1397.	124.	53.	327.	14418.	12446.
1981	0.	0.	0.	124.	0.	410.	15271.	13018.
1982	0.	0.	0.	124.	0.	410.	16035.	13615.
1983	0.	0.	0.	0.	0.	410.	16836.	14239.
1984	0.	0.	0.	0.	0.	410.	17678.	14579.
1985	0.	0.	0.	0.	0.	410.	18560.	15577.
1986	0.	0.	0.	0.	0.	410.	19190.	16063.
1987	0.	0.	0.	0.	0.	410.	19927.	16558.
1988	0.	0.	0.	0.	0.	410.	20516.	17087.
1989	0.	0.	0.	0.	0.	410.	21209.	17622.
1990	0.	0.	0.	0.	0.	410.	21648.	17996.
1991	0.	0.	0.	0.	0.	410.	22302.	18462.
1992	0.	0.	0.	0.	0.	410.	22681.	18752.
1993	0.	0.	0.	0.	0.	410.	23066.	19047.
1994	0.	0.	0.	0.	0.	410.	23460.	19347.
1995	0.	0.	0.	0.	0.	410.	23859.	19652.
1996	0.	0.	0.	0.	0.	410.	23859.	19652.
1997	0.	0.	0.	0.	0.	410.	23859.	19652.
1998	0.	0.	0.	0.	0.	410.	23859.	19652.
1999	0.	0.	0.	0.	0.	410.	23859.	19652.
2000	0.	0.	0.	0.	0.	410.	23859.	19652.
2001	0.	0.	0.	0.	0.	410.	23859.	19652.
2002	0.	0.	0.	0.	0.	410.	23859.	19652.
2003	0.	0.	0.	0.	0.	410.	23859.	19652.
2004	0.	0.	0.	0.	0.	410.	23859.	19652.
2005	-3926.	-1101.	-524.	0.	0.	410.	23859.	19652.

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO BARIT RIVER IRRIGATION SYSTEM

INTERNAL RETURN ON TOTAL CAPITAL 14.592 PERCENT

PERIOD NO.	YEAR	INVESTMENT (PESO1000) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (PESO1000) TOTAL REVENUE	OPERATING EXPENSES	NET REVENUE	PRESENT VALUE FACTOR	PRESENT VALUE TOTAL INVESTMENT	PRESENT VALUE NET REVENUE
1	1978	7026.	0.	7026.	11030.	11030.	0.	1.0000	7026.	0.
2	1979	6294.	178.	6472.	12843.	11747.	1096.	0.8727	5648.	956.
3	1980	4390.	327.	4717.	14418.	12446.	1972.	0.7615	3592.	1502.
4	1981	124.	410.	534.	15271.	13018.	2253.	0.6646	355.	1497.
5	1982	124.	410.	534.	16035.	13615.	2420.	0.5799	310.	1403.
6	1983	0.	410.	410.	16836.	14239.	2597.	0.5061	208.	1314.
7	1984	0.	410.	410.	17678.	14579.	3099.	0.4416	181.	1369.
8	1985	0.	410.	410.	18560.	15577.	2983.	0.3854	158.	1150.
9	1986	0.	410.	410.	19190.	16063.	3127.	0.3363	138.	1052.
10	1987	0.	410.	410.	19827.	16558.	3269.	0.2935	120.	959.
11	1988	0.	410.	410.	20516.	17087.	3429.	0.2561	105.	878.
12	1989	0.	410.	410.	21209.	17622.	3587.	0.2235	92.	802.
13	1990	0.	410.	410.	21648.	17996.	3652.	0.1951	80.	712.
14	1991	0.	410.	410.	22302.	18462.	3840.	0.1702	70.	654.
15	1992	0.	410.	410.	22681.	18752.	3929.	0.1485	61.	584.
16	1993	0.	410.	410.	23066.	19047.	4019.	0.1296	53.	521.
17	1994	0.	410.	410.	23460.	19347.	4113.	0.1131	46.	465.
18	1995	0.	410.	410.	23859.	19652.	4207.	0.0987	41.	415.
19	1996	0.	410.	410.	23859.	19652.	4207.	0.0861	35.	362.
20	1997	0.	410.	410.	23859.	19652.	4207.	0.0752	31.	316.
21	1998	0.	410.	410.	23859.	19652.	4207.	0.0656	27.	276.
22	1999	0.	410.	410.	23859.	19652.	4207.	0.0572	23.	241.
23	2000	0.	410.	410.	23859.	19652.	4207.	0.0500	21.	210.
24	2001	0.	410.	410.	23859.	19652.	4207.	0.0436	18.	183.
25	2002	0.	410.	410.	23859.	19652.	4207.	0.0380	16.	160.
26	2003	0.	410.	410.	23859.	19652.	4207.	0.0332	14.	140.
27	2004	0.	410.	410.	23859.	19652.	4207.	0.0290	12.	122.
28	2005	-5551.	410.	-5140.	23859.	19652.	4207.	0.0253	-130.	106.
	TOTAL	12408.	10765.	23172.	579019.	483357.	95662.		18351.	18351.

INTEREST PER CENT	BENEFIT/COST RATIO
10.000	1.395
11.000	1.289
12.000	1.196
13.000	1.113
14.000	1.040
15.000	0.974

PRESENT VALUE IN PESO1000		
REVENUE	OUTLAY	BALANCE
27403.	19641.	7762.
24920.	19331.	5589.
22764.	19038.	3726.
20882.	18761.	2121.
19233.	18499.	734.
17780.	18252.	-472.

ALTERNATIVE:

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO BARIT RIVER IRRIGATION SYSTEM

YEAR	INVESTMENT COMPONENT 1	INVESTMENT COMPONENT 2	INVESTMENT COMPONENT 3	INVESTMENT COMPONENT 4	INVESTMENT COMPONENT 5	MAINTENANCE	FARM INCOME WITH PROJECT	FARM INCOME WITHOUT PROJECT
SCALERS:	0.86	1.00	1.00	1.00	1.00	0.92	1.00	1.00
1978	5334.	1857.	0.	415.	165.	0.	11030.	11030.
1979	4574.	1420.	0.	772.	166.	204.	12843.	11747.
1980	3272.	0.	1397.	124.	53.	376.	14418.	12446.
1981	0.	0.	0.	124.	0.	472.	15271.	13018.
1982	0.	0.	0.	124.	0.	472.	16035.	13615.
1983	0.	0.	0.	0.	0.	472.	16836.	14239.
1984	0.	0.	0.	0.	0.	472.	17678.	14579.
1985	0.	0.	0.	0.	0.	472.	18560.	15577.
1986	0.	0.	0.	0.	0.	472.	19190.	16063.
1987	0.	0.	0.	0.	0.	472.	19827.	16558.
1988	0.	0.	0.	0.	0.	472.	20516.	17087.
1989	0.	0.	0.	0.	0.	472.	21209.	17622.
1990	0.	0.	0.	0.	0.	472.	21648.	17996.
1991	0.	0.	0.	0.	0.	472.	22302.	18462.
1992	0.	0.	0.	0.	0.	472.	22681.	18752.
1993	0.	0.	0.	0.	0.	472.	23066.	19047.
1994	0.	0.	0.	0.	0.	472.	23460.	19347.
1995	0.	0.	0.	0.	0.	472.	23859.	19652.
1996	0.	0.	0.	0.	0.	472.	23859.	19652.
1997	0.	0.	0.	0.	0.	472.	23859.	19652.
1998	0.	0.	0.	0.	0.	472.	23859.	19652.
1999	0.	0.	0.	0.	0.	472.	23859.	19652.
2000	0.	0.	0.	0.	0.	472.	23859.	19652.
2001	0.	0.	0.	0.	0.	472.	23859.	19652.
2002	0.	0.	0.	0.	0.	472.	23859.	19652.
2003	0.	0.	0.	0.	0.	472.	23859.	19652.
2004	0.	0.	0.	0.	0.	472.	23859.	19652.
2005	-4562.	-1101.	-524.	0.	0.	472.	23859.	19652.

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO
BARIT RIVER IRRIGATION SYSTEM

INTERNAL RETURN ON TOTAL CAPITAL 13.043 PERCENT

PERIOD NO.	YEAR	INVESTMENT (PESO1000) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (PESO1000) TOTAL REVENUE	OPERATING EXPENSES	NET REVENUE	PRESENT VALUE FACTOR	PRESENT VALUE TOTAL INVESTMENT	PRESENT VALUE NET REVENUE
1	1978	7771.	0.	7771.	11030.	11030.	0.	1.0000	7771.	0.
2	1979	6932.	204.	7137.	12843.	11747.	1096.	0.8846	6313.	970.
3	1980	4846.	376.	5223.	14418.	12446.	1972.	0.7825	4087.	1543.
4	1981	124.	472.	596.	15271.	13018.	2253.	0.6923	413.	1560.
5	1982	124.	472.	596.	16035.	13615.	2420.	0.6124	365.	1482.
6	1983	0.	472.	472.	16836.	14239.	2597.	0.5417	256.	1407.
7	1984	0.	472.	472.	17678.	14579.	3099.	0.4792	226.	1485.
8	1985	0.	472.	472.	18560.	15577.	2983.	0.4239	200.	1265.
9	1986	0.	472.	472.	19190.	16063.	3127.	0.3750	177.	1173.
10	1987	0.	472.	472.	19827.	16558.	3269.	0.3317	157.	1084.
11	1988	0.	472.	472.	20516.	17087.	3429.	0.2935	139.	1006.
12	1989	0.	472.	472.	21209.	17622.	3587.	0.2596	123.	931.
13	1990	0.	472.	472.	21648.	17996.	3652.	0.2296	108.	839.
14	1991	0.	472.	472.	22302.	18462.	3840.	0.2032	96.	780.
15	1992	0.	472.	472.	22681.	18752.	3929.	0.1797	85.	706.
16	1993	0.	472.	472.	23066.	19047.	4019.	0.1590	75.	639.
17	1994	0.	472.	472.	23460.	19347.	4113.	0.1406	66.	578.
18	1995	0.	472.	472.	23859.	19652.	4207.	0.1244	59.	523.
19	1996	0.	472.	472.	23859.	19652.	4207.	0.1101	52.	463.
20	1997	0.	472.	472.	23859.	19652.	4207.	0.0974	46.	410.
21	1998	0.	472.	472.	23859.	19652.	4207.	0.0861	41.	362.
22	1999	0.	472.	472.	23859.	19652.	4207.	0.0762	36.	321.
23	2000	0.	472.	472.	23859.	19652.	4207.	0.0674	32.	284.
24	2001	0.	472.	472.	23859.	19652.	4207.	0.0596	28.	251.
25	2002	0.	472.	472.	23859.	19652.	4207.	0.0527	25.	222.
26	2003	0.	472.	472.	23859.	19652.	4207.	0.0467	22.	196.
27	2004	0.	472.	472.	23859.	19652.	4207.	0.0413	19.	174.
28	2005	-6187.	472.	-5715.	23859.	19652.	4207.	0.0365	-209.	154.
	TOTAL	13610.	12380.	25990.	579019.	483357.	95662.		20806.	20806.

INTEREST PER CENT	BENEFIT/COST RATIO	PRESENT VALUE IN PESO1000 REVENUE	OUTLAY	BALANCE
10.000	1.256	27403.	21821.	5582.
11.000	1.161	24920.	21468.	3452.
12.000	1.077	22764.	21134.	1630.
13.000	1.003	20882.	20619.	63.
14.000	0.937	19233.	20523.	-1290.
15.000	0.878	17780.	20243.	-2463.

ALTERNATIVE:

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO BARIT RIVER IRRIGATION SYSTEM

YEAR	INVESTMENT COMPONENT 1	INVESTMENT COMPONENT 2	INVESTMENT COMPONENT 3	INVESTMENT COMPONENT 4	INVESTMENT COMPONENT 5	MAINTENANCE	FARM INCOME WITH PROJECT	FARM INCOME WITHOUT PROJECT
SCALERS:	0.60	1.00	1.00	1.00	1.00	0.72	1.00	1.00
1978	3721.	1857.	0.	415.	165.	0.	11030.	11030.
1979	3191.	1420.	0.	772.	166.	160.	12843.	11747.
1980	2283.	0.	1397.	124.	53.	294.	14418.	12446.
1981	0.	0.	0.	124.	0.	369.	15271.	13018.
1982	0.	0.	0.	124.	0.	369.	16035.	13615.
1983	0.	0.	0.	0.	0.	369.	16836.	14239.
1984	0.	0.	0.	0.	0.	369.	17678.	14579.
1985	0.	0.	0.	0.	0.	369.	18560.	15577.
1986	0.	0.	0.	0.	0.	369.	19190.	16063.
1987	0.	0.	0.	0.	0.	369.	19827.	16558.
1988	0.	0.	0.	0.	0.	369.	20516.	17087.
1989	0.	0.	0.	0.	0.	369.	21209.	17622.
1990	0.	0.	0.	0.	0.	369.	21648.	17996.
1991	0.	0.	0.	0.	0.	369.	22302.	18462.
1992	0.	0.	0.	0.	0.	369.	22681.	18752.
1993	0.	0.	0.	0.	0.	369.	23066.	19047.
1994	0.	0.	0.	0.	0.	369.	23460.	19347.
1995	0.	0.	0.	0.	0.	369.	23859.	19652.
1996	0.	0.	0.	0.	0.	369.	23859.	19652.
1997	0.	0.	0.	0.	0.	369.	23859.	19652.
1998	0.	0.	0.	0.	0.	369.	23859.	19652.
1999	0.	0.	0.	0.	0.	369.	23859.	19652.
2000	0.	0.	0.	0.	0.	369.	23859.	19652.
2001	0.	0.	0.	0.	0.	369.	23859.	19652.
2002	0.	0.	0.	0.	0.	369.	23859.	19652.
2003	0.	0.	0.	0.	0.	369.	23859.	19652.
2004	0.	0.	0.	0.	0.	369.	23859.	19652.
2005	-3183.	-1101.	-524.	0.	0.	369.	23859.	19652.

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO BARIT RIVER IRRIGATION SYSTEM

INTERNAL RETURN ON TOTAL CAPITAL 16.617 PERCENT

PERIOD NO.	YEAR	INVESTMENT (PESO1000) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (PESO1000) TOTAL REVENUE	OPERATING EXPENSES	NET REVENUE	PRESENT VALUE FACTOR	PRESENT VALUE TOTAL INVESTMENT	PRESENT VALUE NET REVENUE
1	1978	6158.	0.	6158.	11030.	11030.	0.	1.0000	6158.	0.
2	1979	5549.	160.	5709.	12843.	11747.	1096.	0.8575	4896.	940.
3	1980	3857.	294.	4151.	14418.	12446.	1972.	0.7353	3053.	1450.
4	1981	124.	369.	493.	15271.	13018.	2253.	0.6305	311.	1421.
5	1982	124.	369.	493.	16035.	13615.	2420.	0.5407	267.	1308.
6	1983	0.	369.	369.	16836.	14239.	2597.	0.4636	171.	1204.
7	1984	0.	369.	369.	17678.	14579.	3099.	0.3976	147.	1232.
8	1985	0.	369.	369.	18560.	15577.	2983.	0.3409	126.	1017.
9	1986	0.	369.	369.	19190.	16063.	3127.	0.2923	108.	914.
10	1987	0.	369.	369.	19827.	16558.	3269.	0.2507	93.	819.
11	1988	0.	369.	369.	20516.	17087.	3429.	0.2150	79.	737.
12	1989	0.	369.	369.	21209.	17622.	3587.	0.1843	68.	661.
13	1990	0.	369.	369.	21648.	17996.	3652.	0.1581	58.	577.
14	1991	0.	369.	369.	22302.	18462.	3840.	0.1355	50.	520.
15	1992	0.	369.	369.	22681.	18752.	3929.	0.1162	43.	457.
16	1993	0.	369.	369.	23066.	19047.	4019.	0.0997	37.	401.
17	1994	0.	369.	369.	23460.	19347.	4113.	0.0855	32.	352.
18	1995	0.	369.	369.	23859.	19652.	4207.	0.0733	27.	308.
19	1996	0.	369.	369.	23859.	19652.	4207.	0.0628	23.	264.
20	1997	0.	369.	369.	23859.	19652.	4207.	0.0539	20.	227.
21	1998	0.	369.	369.	23859.	19652.	4207.	0.0462	17.	194.
22	1999	0.	369.	369.	23859.	19652.	4207.	0.0396	15.	167.
23	2000	0.	369.	369.	23859.	19652.	4207.	0.0340	13.	143.
24	2001	0.	369.	369.	23859.	19652.	4207.	0.0291	11.	123.
25	2002	0.	369.	369.	23859.	19652.	4207.	0.0250	9.	105.
26	2003	0.	369.	369.	23859.	19652.	4207.	0.0214	8.	90.
27	2004	0.	369.	369.	23859.	19652.	4207.	0.0184	7.	77.
28	2005	-4808.	369.	-4439.	23859.	19652.	4207.	0.0158	-70.	66.
	TOTAL	11005.	9688.	20693.	579019.	483357.	95662.		15775.	15775.

INTEREST PER CENT	BENEFIT/COST RATIO
10.000	1.578
11.000	1.459
12.000	1.354
13.000	1.260
14.000	1.178
15.000	1.104

PRESENT VALUE IN PESO1000 REVENUE	OUTLAY	BALANCE
27403.	17361.	10042.
24920.	17081.	7839.
22764.	16816.	5947.
20882.	16567.	4315.
19233.	16331.	2901.
17780.	16109.	1671.

ALTERNATIVE:

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO BARIT RIVER IRRIGATION SYSTEM

YEAR	INVESTMENT COMPONENT 1	INVESTMENT COMPONENT 2	INVESTMENT COMPONENT 3	INVESTMENT COMPONENT 4	INVESTMENT COMPONENT 5	MAINTENANCE	FARM INCOME WITH PROJECT	FARM INCOME WITHOUT PROJECT
SCALERS:	0.60	1.00	1.00	1.00	1.00	0.72	1.00	0.95
1978	3721.	1857.	0.	415.	165.	0.	11030.	10478.
1979	3191.	1420.	0.	772.	166.	160.	12843.	11160.
1980	2283.	0.	1397.	124.	53.	294.	14418.	11824.
1981	0.	0.	0.	124.	0.	369.	15271.	12367.
1982	0.	0.	0.	124.	0.	369.	16035.	12934.
1983	0.	0.	0.	0.	0.	369.	16836.	13527.
1984	0.	0.	0.	0.	0.	369.	17678.	13850.
1985	0.	0.	0.	0.	0.	369.	18560.	14798.
1986	0.	0.	0.	0.	0.	369.	19190.	15260.
1987	0.	0.	0.	0.	0.	369.	19827.	15730.
1988	0.	0.	0.	0.	0.	369.	20516.	16233.
1989	0.	0.	0.	0.	0.	369.	21209.	16741.
1990	0.	0.	0.	0.	0.	369.	21648.	17096.
1991	0.	0.	0.	0.	0.	369.	22302.	17539.
1992	0.	0.	0.	0.	0.	369.	22681.	17814.
1993	0.	0.	0.	0.	0.	369.	23066.	18095.
1994	0.	0.	0.	0.	0.	369.	23460.	18380.
1995	0.	0.	0.	0.	0.	369.	23859.	18669.
1996	0.	0.	0.	0.	0.	369.	23859.	18669.
1997	0.	0.	0.	0.	0.	369.	23859.	18669.
1998	0.	0.	0.	0.	0.	369.	23859.	18669.
1999	0.	0.	0.	0.	0.	369.	23859.	18669.
2000	0.	0.	0.	0.	0.	369.	23859.	18669.
2001	0.	0.	0.	0.	0.	369.	23859.	18669.
2002	0.	0.	0.	0.	0.	369.	23859.	18669.
2003	0.	0.	0.	0.	0.	369.	23859.	18669.
2004	0.	0.	0.	0.	0.	369.	23859.	18669.
2005	-3183.	-1101.	-524.	0.	0.	369.	23859.	18669.

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO
BARIT RIVER IRRIGATION SYSTEM

INTERNAL RETURN ON TOTAL CAPITAL 22.200 PERCENT

PERIOD NO.	YEAR	INVESTMENT (PESO1000) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (PESO1000) TOTAL REVENUE	OPERATING EXPENSES	NET REVENUE	PRESENT VALUE FACTOR	PRESENT VALUE TOTAL INVESTMENT	PRESENT VALUE NET REVENUE
1	1978	6156.	0.	6158.	11030.	10478.	552.	1.0000	6158.	552.
2	1979	5549.	160.	5709.	12843.	11160.	1683.	0.8183	4672.	1378.
3	1980	3857.	294.	4151.	14418.	11824.	2594.	0.6697	2780.	1737.
4	1981	124.	369.	493.	15271.	12367.	2904.	0.5460	270.	1591.
5	1982	124.	369.	493.	16035.	12934.	3101.	0.4485	221.	1391.
6	1983	0.	369.	369.	16836.	13527.	3309.	0.3670	136.	1214.
7	1984	0.	369.	369.	17678.	13850.	3828.	0.3003	111.	1150.
8	1985	0.	369.	369.	18560.	14798.	3762.	0.2458	91.	925.
9	1986	0.	369.	369.	19190.	15260.	3930.	0.2011	74.	790.
10	1987	0.	369.	369.	19827.	15730.	4097.	0.1646	61.	674.
11	1988	0.	369.	369.	20516.	16233.	4283.	0.1347	50.	577.
12	1989	0.	369.	369.	21209.	16741.	4468.	0.1102	41.	492.
13	1990	0.	369.	369.	21648.	17096.	4552.	0.0902	33.	411.
14	1991	0.	369.	369.	22302.	17539.	4763.	0.0738	27.	352.
15	1992	0.	369.	369.	22681.	17814.	4867.	0.0604	22.	294.
16	1993	0.	369.	369.	23066.	18095.	4971.	0.0494	18.	246.
17	1994	0.	369.	369.	23460.	18380.	5080.	0.0404	15.	205.
18	1995	0.	369.	369.	23859.	18669.	5190.	0.0331	12.	172.
19	1996	0.	369.	369.	23859.	18669.	5190.	0.0271	10.	141.
20	1997	0.	369.	369.	23859.	18669.	5190.	0.0222	8.	115.
21	1998	0.	369.	369.	23859.	18669.	5190.	0.0181	7.	94.
22	1999	0.	369.	369.	23859.	18669.	5190.	0.0148	5.	77.
23	2000	0.	369.	369.	23859.	18669.	5190.	0.0121	4.	63.
24	2001	0.	369.	369.	23859.	18669.	5190.	0.0099	4.	52.
25	2002	0.	369.	369.	23859.	18669.	5190.	0.0081	3.	42.
26	2003	0.	369.	369.	23859.	18669.	5190.	0.0067	2.	35.
27	2004	0.	369.	369.	23859.	18669.	5190.	0.0054	2.	28.
28	2005	-4808.	369.	-4439.	23859.	18669.	5190.	0.0045	-20.	23.
	TOTAL	11005.	9688.	20693.	579019.	459189.	119830.		14819.	14819.

INTEREST PER CENT	BENEFIT/COST RATIO
10.000	2.028
11.000	1.880
12.000	1.750
13.000	1.635
14.000	1.532
15.000	1.441

PRESENT VALUE IN PESO1000 REVENUE	OUTLAY	BALANCE
35203.	17361.	17641.
32112.	17081.	15031.
29426.	16816.	12610.
27081.	16567.	10514.
25024.	16331.	8693.
23211.	16109.	7102.

ALTERNATIVE:

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO BARIT RIVER IRRIGATION SYSTEM

YEAR	INVESTMENT COMPONENT 1	INVESTMENT COMPONENT 2	INVESTMENT COMPONENT 3	INVESTMENT COMPONENT 4	INVESTMENT COMPONENT 5	MAINTENANCE	FARM INCOME WITH PROJECT	FARM INCOME WITHOUT PROJECT
SCALERS:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95
1978	6202.	1857.	0.	415.	165.	0.	11030.	10478.
1979	5319.	1420.	0.	772.	166.	222.	12843.	11160.
1980	3805.	0.	1397.	124.	53.	409.	14418.	11824.
1981	0.	0.	0.	124.	0.	513.	15271.	12367.
1982	0.	0.	0.	124.	0.	513.	16035.	12934.
1983	0.	0.	0.	0.	0.	513.	16836.	13527.
1984	0.	0.	0.	0.	0.	513.	17678.	13850.
1985	0.	0.	0.	0.	0.	513.	18560.	14798.
1986	0.	0.	0.	0.	0.	513.	19190.	15260.
1987	0.	0.	0.	0.	0.	513.	19827.	15730.
1988	0.	0.	0.	0.	0.	513.	20516.	16233.
1989	0.	0.	0.	0.	0.	513.	21209.	16741.
1990	0.	0.	0.	0.	0.	513.	21648.	17096.
1991	0.	0.	0.	0.	0.	513.	22302.	17539.
1992	0.	0.	0.	0.	0.	513.	22681.	17814.
1993	0.	0.	0.	0.	0.	513.	23066.	18095.
1994	0.	0.	0.	0.	0.	513.	23460.	18380.
1995	0.	0.	0.	0.	0.	513.	23859.	18669.
1996	0.	0.	0.	0.	0.	513.	23859.	18669.
1997	0.	0.	0.	0.	0.	513.	23859.	18669.
1998	0.	0.	0.	0.	0.	513.	23859.	18669.
1999	0.	0.	0.	0.	0.	513.	23859.	18669.
2000	0.	0.	0.	0.	0.	513.	23859.	18669.
2001	0.	0.	0.	0.	0.	513.	23859.	18669.
2002	0.	0.	0.	0.	0.	513.	23859.	18669.
2003	0.	0.	0.	0.	0.	513.	23859.	18669.
2004	0.	0.	0.	0.	0.	513.	23859.	18669.
2005	-5335.	-1101.	-524.	0.	0.	513.	23859.	18669.

NET RETURNS TO IRRIGATION AND DRAINAGE IMPROVEMENTS TO
BARIT RIVER IRRIGATION SYSTEM

INTERNAL RETURN ON TOTAL CAPITAL 15.612 PERCENT

PERIOD NO.	YEAR	INVESTMENT (PESO1000) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (PESO1000) TOTAL REVENUE	OPERATING EXPENSES	NET REVENUE	PRESENT VALUE FACTOR	PRESENT VALUE TOTAL INVESTMENT	PRESENT VALUE NET REVENUE
1	1978	8639.	0.	8639.	11030.	10478.	552.	1.0000	8639.	552.
2	1979	7677.	222.	7899.	12843.	11160.	1683.	0.8650	6832.	1456.
3	1980	5379.	409.	5788.	14418.	11824.	2594.	0.7482	4330.	1941.
4	1981	124.	513.	637.	15271.	12367.	2904.	0.6471	412.	1879.
5	1982	124.	513.	637.	16035.	12934.	3101.	0.5597	357.	1736.
6	1983	0.	513.	513.	16836.	13527.	3309.	0.4842	248.	1602.
7	1984	0.	513.	513.	17678.	13850.	3828.	0.4188	215.	1603.
8	1985	0.	513.	513.	18560.	14798.	3762.	0.3622	186.	1363.
9	1986	0.	513.	513.	19190.	15260.	3930.	0.3133	161.	1231.
10	1987	0.	513.	513.	19827.	15730.	4097.	0.2710	139.	1110.
11	1988	0.	513.	513.	20516.	16233.	4283.	0.2344	120.	1004.
12	1989	0.	513.	513.	21209.	16741.	4468.	0.2028	104.	906.
13	1990	0.	513.	513.	21648.	17096.	4552.	0.1754	90.	798.
14	1991	0.	513.	513.	22302.	17539.	4763.	0.1517	78.	723.
15	1992	0.	513.	513.	22681.	17814.	4867.	0.1312	67.	639.
16	1993	0.	513.	513.	23066.	18095.	4971.	0.1135	58.	564.
17	1994	0.	513.	513.	23460.	18380.	5080.	0.0982	50.	499.
18	1995	0.	513.	513.	23859.	18669.	5190.	0.0849	44.	441.
19	1996	0.	513.	513.	23859.	18669.	5190.	0.0734	38.	381.
20	1997	0.	513.	513.	23859.	18669.	5190.	0.0635	33.	330.
21	1998	0.	513.	513.	23859.	18669.	5190.	0.0549	28.	285.
22	1999	0.	513.	513.	23859.	18669.	5190.	0.0475	24.	247.
23	2000	0.	513.	513.	23859.	18669.	5190.	0.0411	21.	213.
24	2001	0.	513.	513.	23859.	18669.	5190.	0.0356	18.	185.
25	2002	0.	513.	513.	23859.	18669.	5190.	0.0308	16.	160.
26	2003	0.	513.	513.	23859.	18669.	5190.	0.0266	14.	138.
27	2004	0.	513.	513.	23859.	18669.	5190.	0.0230	12.	119.
28	2005	-6930.	513.	-6417.	23859.	18669.	5190.	0.0199	-128.	103.
	TOTAL	15013.	13456.	28469.	579019.	459189.	119830.		22206.	22206.

INTEREST PER CENT	BENEFIT/COST RATIO
10.000	1.461
11.000	1.354
12.000	1.260
13.000	1.177
14.000	1.103
15.000	1.037

PRESENT VALUE IN PESO1000 REVENUE	OUTLAY	BALANCE
35203.	24101.	11102.
32112.	23718.	8394.
29426.	23355.	6071.
27081.	23013.	4068.
25024.	22690.	2334.
23211.	22385.	826.

ALTERNATIVE:

PART V

LISTING OF PROGRAM DECK

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C                    KANSAS STATE UNIVERSITY                                         5
C                                                                                    6
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0024                 IF (OPTION.NE.DICK) GO TO 7045                            83
0025                 WRITE(NPR,7500)                                           84
0026              7500 FORMAT (' ',''BEGINNING YEAR IS VARIABLE" OPTION IS BEING USED'/)  85
0027                 GO TO 7645                                                86
0028              7045 WRITE(NPR,7600)                                         87
0029              7600 FORMAT (' ',''BEGINNING YEAR IS VARIABLE" OPTION IS NOT BEING',  88
                   1' USED'/)                                                  89
0030              7645 IF(IBC.NE.1) GO TO 1000                                 90
                C                                                              91
                C          4.  IF ORDERED, READ DISCOUNT RATES FOR B/C RATIOS  92
                C              ENTER RATES AS DECIMALS (E.G., 10 % AS 0.10) IN THE  93
                C                  SAME ORDER DESIRED IN PRINTOUT              94
                C              FORMAT IS 6F6.5                                 95
                C              THIS STEP IS INCLUDED ONCE FOR THE ENTIRE RUN   A95
                C                                                              96
0031                 READ(INF,991)RATE                                         97
0032               991 FORMAT(6F6.5)                                           98
0033                 WRITE(NPR,992)RATE                                        99
0034               992 FORMAT(' ',6F10.5)                                      100
0035                 DO 4001L =1,6                                             101
0036              4001 IF(RATE(L).NE.1) NDCR=L                                 102
0037                 REWIND NST                                                103
                C                                                              104
                C       II. READ CONTROL CARD FOR GIVEN PROBLEM & SET UP DIMENSIONS  105
                C                                                              106
                C          5.  READ THE CONTROL CARD FOR THE PROBLEM           107
                C            A. NFAC = NUMBER OF COLUMNS OF INVESTMENT OUTLAY DATA  108
                C            B. NWC  = NUMBER OF COLUMNS OF WORKING CAPITAL DATA  109
                C            C. NREV = NUMBER OF COLUMNS OF REVENUE AND INCOME DATA  110
                C            D. NEXP = NUMBER OF COLUMNS OF OPERATING EXPENSE DATA  111
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C                NOTE: A + B + C + D MUST NOT EXCEED 9                          112
C
C              E. IRRW = TYPE OF ANALYSIS AND OUTPUT FORMAT                     113
C                   1 = IRR;  2 = DRR;  3 = ARR;  4 = SRR;                      114
C                   5 = CRR;  6 = FRR;  7 = NPV.                                115
C              F. NSCALE = NUMBER OF SCALE CARDS TO READ AND USE                116
C              G. ICARDS = PUNCH CARDS;  YES = 1,  NO = 0.                      117
C              H. INT    = DISCOUNT RATE TO USE WITH THE NPV OPTION             118
C                  FORMAT IS 11,11,11,11,11,12,11,F8.6                         119
C                  THIS AND THE REMAINING STEPS ARE REPEATED FOR EACH          A119
C                  PROBLEM INCLUDED IN THE RUN.                                B119
C                                                                              120
0038          1000 READ(INF,1033,END=1001)NFAC,NWC,NREV,NEXP,IRRW,NSCALE,ICARDS,INT  121
0039          1033 FORMAT (511,12,11,F8.6)                                      122
0040               JFAC1=1                                                      123
0041               JFAC2=JFAC1+NFAC-1                                           124
0042               JWC1=JFAC2+1                                                 125
0043               JWC2=JWC1+NWC-1                                              126
0044               IF(NFAC.EQ.0)JFAC1=0                                         127
0045               JREV1=JWC2+1                                                 128
0046               JREV2=JREV1+NREV-1                                           129
0047               JEXP1=JREV2+1                                                130
0048               JEXP2=JEXP1+NEXP-1                                           131
0049               IF(JREV2.LE.9) GO TO 20                                      132
0050               WRITE(NPR,113)JEXP2                                          133
0051           113 FORMAT('1STOPPED. MAXIMUM ENTRIES = 9. YOU HAVE ',I3)        134
0052               STOP                                                         135
C                                                                              136
C               III. READ HEADER CARDS (PLUS SCALE FACTOR CARDS, IF ANY)       137
C                                                                              138
C                    6.  READ THE TITLE CARDS FOR THE PROBLEM                  139
C                          1 CARD FOR FIRST LINE OF TITLE, CENTERED IN 80 COLS.  140
C                          1 CARD FOR SECOND LINE OF TITLE (OR BLANK CARD)     141
C                        FORMAT IS 20A4                                        142
C                                                                              A142
0053            20 READ(INF,100,END=1001)HEAD                                  143
C                                                                              144
C                    7.  READ THE INPUT COLUMN HEADERS AND BASE CASE FOOTNOTE   145
C                      A. TWO CARDS FOR 132 COLUMNS, F. 2X, A6, 4X, 9(A10,2X)  146
C                      B. ONE CARD FOR BASE CASE FOOTNOTE.  FORMAT IS 20A4     147
C                                                                              148
0054               READ(INF,100)HEAD1                                          149
0055               READ (INF,100) HEAD2                                        150
0056               ISCALE = -1                                                 151
0057               IF (NSCALE.EQ.0) GO TO 56                                   152
C                                                                              153
C                    8.  IF ORDERED, READ FOOTNOTE AND SCALE CARDS FOR EACH ALT.  A153
C                          (TOTAL NUMBER OF EACH = NSCALE)                     B153
C                           ORDER IS ALT. 1, FOOTNOTE, SCALER; ALT. 2, DITTO;;  C153
C                        ENTER FOOTNOTE TO IDENTIFY ALTERNATIVE, STARTING      D153
C                           IN COLUMN 1                                        E153
C                        FORMAT IS 20A4                                        F153
C                          ENTER SCALE FACTORS AS MULTIPLIERS, MATCHING INPUT   G153
C                            COLUMNS TO BE SCALED.  ENTER "1.0" FOR COLUMNS    H153
C                            WHICH ARE NOT SCALED                              I153
C                        FORMAT IS 8X, 9F8.4                                   J153
C                                                                              154
0058               ICN5=0                                                      155
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0059                DO 50 J1=1,NSCALE                                          156
0060                ICN4=ICN5 + 1                                              157
                C
0061                ICN5=ICN5 + 20                                             158
0062                READ(INF,100)(HEADJ (L), L=ICN4,ICN5)                      159
0063                READ(INF,106)(CONV(J1,K),K=1,9)                            160
0064              106 FORMAT (8X,9F8.4)                                        161
0065               50 CONTINUE                                                 162
0066               56 DO 2003 I=1,500                                          163
0067                DO 2002 K=1,9                                              164
0068             2002 OUT(I,K)=0.                                              165
                C                                                              166
                C       IV. READ THE DATA CARDS FOR THE PROBLEM AND PUT ON DISC 167
                C                                                              168
                C           9.  READ THE DATA FOR THE PROBLEM, ONE CARD FOR EACH PERIOD 169
                C                  INO  GOES IN THE FIRST FIELD AND INDICATES SEQUENCE. 170
                C                    PERIODS PRIOR TO PRESENT ENTERED AS -3, -2, -1.   171
                C                  IYR  GOES IN THE 2ND FIELD, AND IDENTIFIES EACH     172
                C                    PERIOD IN THE OUTPUT TABLE AS "1975","1075","JA75", 173
                C                  INPUT DATA GO IN THE REMAINING FIELDS AS INDICATED ON 174
                C                    THE CONTROL CARD.  IF THERE ARE NEGATIVE OUTLAYS,  175
                C                    INCOMES OR EXPENSES, INSERT "-" BEFORE FIRST       176
                C                    DIGIT.  RIGHT JUSTIFY DATA, OR INSERT DECIMAL PT.  177
                C                FORMAT IS I4, A4, 9F8.0                        178
                C                                                              179
0069                READ (NDATA,105,END=1001)INO(I),IYR(I),CASH                180
0070                WRITE (NST,105) INO(I),IYR(I),CASH                         181
0071              105 FORMAT(I4,A4,9F8.0)                                      182
                C                                                              183
                C           10. END OF DATA CARD                               184
                C               ENTER "9999" IN FIRST FIELD                    A184
                C                  THIS CARD MUST BE INSERTED FOR EACH PROBLEM FOR WHICH  B184
                C                  MASTER CONTROL CARD PROVIDED (SEE STEP 5)    C184
                C                                                               D184
0072                IF(INO(I).EQ.9999) GO TO 2004                              185
0073             2003 CONTINUE                                                 186
0074             2004 REWIND NST                                               187
                C                                                              A187
                C       V. SCALE THE DATA, IF ORDERED, AND PRINT THE INPUT     B187
0075                IPR5=0                                                     188
0076               55   DUMMY = 0.
                C--55 WRITE(NPR,112)                                           189
0077              112 FORMAT('1 A LISTING OF THE DATA'/)                       190
                C--   WRITE(NPR,1034)NFAC,NWC,NREV,NEXP,IRRW,NSCALE,ICARDS,INT 191
0078             1034 FORMAT (' ',5I1,1X,I2,1X,I1,1X,F8.6)                     192
0079                WRITE(NPR,103) HEAD                                        193
0080              103 FORMAT ('1',  2 (30X,20A4/))                             194
                C--   WRITE(NPR,102) HEADI                                     195
0081              102 FORMAT (' ',33A4,/'+',2X,6('_'),4X,9(10('_'),2X)/)       196
0082                WRITE(NPR,201)
0083             201  FORMAT( // 7X, 5('INVESTMENT      '), 14X, 'FARM INCOME',
                *         5X, 'FARM INCOME' / ' YEAR  COMPONENT 1    COMPONENT 2',
                *         '    COMPONENT 3    COMPONENT 4    COMPONENT 5   ',
                *         'MAINTENANCE   WITH PROJECT   WITHOUT PROJECT' / , '+',
                *         '____  ', 4('___________     '), 2('___________   '),
                *         12('_'), 3X, 15('_') / )
0084                ISCALE=ISCALE+1                                            197
0085                IF (NSCALE.EQ.0) GO TO 2005                                198
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0086                  IF (ISCALE.EQ.0) GO TO 2005                                  199
0087                  IPR4=IPR5 + 1                                                200
0088                  IPR5=IPR4 + 19                                               201
0089                  J1 = ISCALE                                                  202
                C--   WRITE(NPR,104)(CONV(J1,K),K=1,9)                             203
0090                  WRITE(NPR,104)(CONV(J1,K),K=1,8)                             203
0091                104 FORMAT (' ','SCALERS:',F8.2,8(6X,F8.2) / )
0092                2005 DO 1005 I = 1,500                                         205
0093                  READ(NST,105,END=1001)INO(I),IYR(I),CASH                     206
0094                  IF(INO(I).EQ.9999) GO TO 1010                                207
0095                  IF (NSCALE.EQ.0) GO TO 65                                    208
0096                  IF (ISCALE.EQ.0) GO TO 65                                    209
                C
0097                  DO 61 K=1,JEXP2                                              210
0098                 61 CASH (K) = CASH (K) * CONV (J1,K)                          211
                C--65 WRITE(NPR,107)INO(I),IYR(I),(CASH(K),K=1,9)                  212
0099                 65 WRITE(NPR,107)       IYR(I),(CASH(K),K=1,8)                212
                C 107 FORMAT (' ',I4,A4,9F12.0)                                    213
0100                 107  FORMAT( 1X, A4, 8(F10.0,5X) )                          213
                C                                                                  214
                C       VI. COMBINE THE INPUT COLUMNS FOR ANALYSIS                 215
                C                                                                  216
0101                  OUT(I,1)=0.                                                  217
0102                  IF(NFAC.NE.0) GO TO 2006                                     218
0103                  GO TO 2007                                                   219
0104                2006 DO 1006 K=1,JFAC2                                         220
0105                1006 OUT(I,1)=OUT(I,1)+CASH(K)                                 221
0106                2007 OUT(I,2) = 0.                                             222
0107                  IF(NWC.NE.0) GO TO 2008                                      223
0108                  GO TO 2009                                                   224
0109                2008 DO 1007 K = JWC1,JWC2                                     225
0110                  OUT(I,2)=OUT(I,2) + CASH(K)                                  226
0111                  IF(IRRW.EQ.5) OUT(I,2)= OUT(I,2)*(-1.0)                      227
0112                  IF(IRRW.EQ.7) OUT(I,2)= OUT(I,2)*(-1.0)                      228
0113                1007 CONTINUE                                                  229
0114                2009 OUT(I,5) = 0.                                             230
0115                  IF(NEXP.NE.0) GO TO 2010                                     231
0116                  GO TO 2011                                                   232
0117                2010 DO 1008 K = JEXP1,JEXP2                                   233
0118                1008 OUT(I,5) = OUT(I,5) + CASH(K)                             234
0119                2011 OUT(I,4) = 0.                                             235
0120                  IF(NREV.NE.0) GO TO 2012                                     236
0121                  GO TO 2013                                                   237
0122                2012 DO 1009 K = JREV1,JREV2                                   238
0123                1009 OUT(I,4) = OUT(I,4) + CASH(K)                             239
0124                2013 OUT(I,3) = OUT(I,1) + OUT(I,2)                            240
0125                  OUT(I,6) = OUT(I,4) - OUT(I,5)                               241
0126                1005 CONTINUE                                                  242
0127                1001 IEND = I                                                  243
0128                  IF(IEND.EQ.1)GO TO 5000                                      244
0129                1010 NOYR=I-1                                                  245
0130                  IF(IRRW.EQ.7) GO TO 1022                                     246
                C                                                                  247
                C       VII. CALCULATE THE RATE OF RETURN AND OUTPUT DATA          248
                C                                                                  249
0131                  DO 1020 I=1,NOYR                                             250
0132                1020 FLOW(I)=OUT(I,6)-OUT(I,3)                                 251
0133                  CALL RRATE(FLOW,NOYR,R,EFAC,IND(1),OPTION,DICK)              252
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0134                  INTRAT=R/100.                                                  253
0135                  GO TO 1021                                                     254
0136             1022 INTRAT=INT                                                     255
0137             1021 ZZ=1.+INTRAT                                                  256
0138                  IF(ZZ.EQ.0.) ZZ=0.001                                          257
0139                  DIV = 1. / ZZ                                                  258
0140             1050 CONTINUE                                                       259
0141                  DO 1055 I = 1,NOYR                                             260
0142                  XI = I                                                         261
0143                  IF(OPTION.EQ.DICK) XI = DFLOAT(INO(1) + I)                     262
0144                  OUT(I,7)=DIV**((XI-1.)/EFAC)                                   263
0145                  IF((DIV.LT.0.).AND.(OUT(I,7).GT.0.)) OUT(I,7)=-OUT(I,7)        264
0146                  IF(IRRW.LT.7) GO TO 1051                                       265
0147                  OUT(I,8)=OUT(I,5) - OUT(I,1)                                   266
0148                  OUT(I,9)=OUT(I,4) - OUT(I,2)                                   267
                 C
0149                  GO TO 1052                                                     268
0150             1051 OUT(I,8)=OUT(I,3)                                              269
0151                  OUT(I,9)=OUT(I,6)                                              270
                 C    COMPUTE DISCOUNTED VALUE OF NET BENEFITS                       271
0152             1052 OUT(I,8)=OUT(I,8)*DIV**((XI-1.)/EFAC)                          272
0153                  IF((DIV.LT.0.).AND.(OUT(I,8).GT.0.)) OUT(I,8)=-OUT(I,8)        273
0154                  IF (IRRW.EQ.7) GO TO 1053                                      274
0155                  OUT(I,9)=OUT(I,9)*DIV**((XI-1.)/EFAC)                          275
0156                  IF((DIV.LT.0.).AND.(OUT(I,9).GT.0.)) OUT(I,9)=-OUT(I,9)        276
0157                  GO TO 1055                                                     277
0158             1053 OUT(I,9)=OUT(I,6)*DIV**((XI-1.)/EFAC)                          278
0159             1055 CONTINUE                                                       279
0160                  DO 1060 I = 1,9                                                280
0161             1060 TOT(I) = 0.                                                    281
0162                  DO 1065 I = 1,NOYR                                             282
0163                  DO 1065 J = 1,9                                                283
0164             1065 TOT(J) = TOT(J)+ OUT(I,J)                                      284
0165                  INTRAT = INTRAT*100.                                           285
                                                                                     286
                      VIII. PRINT THE BODY OF THE OUTPUT TABLE                       287
                                                                                     288
                 --   WRITE(NPR,450)                                                 289
0166              450 FORMAT('1',39X,'I N V E S T M E N T  F E A S I B I L I T Y  A N 290
                    1A L Y S I S')                                                   291
0167              543 GO TO (451,452,453,454,455,456,457),IRRW                       292
0168              451 WRITE(NPR,150)HEAD,INTRAT,MEASP1,MEASR2,MEASR1,MEASR2          293
0169              150 FORMAT('1', 2(30X,20A4/) / 30X,'INTERNAL RETURN ON TOTAL CAPITAL', 294
                    1F10.3,'  PERCENT'/'+',63X,9('_')///21X,'INVESTMENT (',2A4,')',  295
                    215X,'    OPERATING (',2A4,')',13X,'PRESENT',7X,'PRESENT VALUE'/'+' 296
                    3,15X,34('_'),4X,34('_'),16X,22('_')/4X,'PERIOD',20X,'WORKING',20X, 297
                    4'TOTAL',5X,'OPERATING',6X,'NET',10X,'VALUE',6X,'TOTAL',9X,'NET'/ 298
                    5'+',12('_')/'  NO.   YEAR    FACILITIES    CAPITAL      TOTAL   299
                    6   REVENUE    EXPENSES      REVENUE        FACTOR   INVESTMENT   R 300
                    7EVENUE'/'+',   5('_'),1X,6('_'),3X,10('_'),2X,10('_'),2X,10('_'), 301
                    84X,10('_'),2X,10('_'),2X,10('_'),6X, 7('_'),3X,10('_'),2X,10('_')) 302
0170                  GO TO 3000                                                     303
0171              452 WRITE(NPR,461)HEAD,INTRAT,MEASR1,MEASR2, MEASP1,MEASR2         304
0172              461 FORMAT(/ 2(30X,20A4/)  /32X,'DIRECT RETURN ON TOTAL CAPITAL',F10.3 305
                    1,'  PERCENT'/'+',63X,9('_'),//21X,'INVESTMENT (',2A4,')',20X,   306
                    2'OPERATING (',2A4,')',    12X,'PRESENT',5X,'PRESENT VALUES'/'+', 307
                    314X,34('_'),4X,34('_'),16X,22('_')/4X,'PERIOD',20X,'WORKING',19X, 308
                    4'DIRECT',4X,'OPERATING',7X,'NET',10X,'VALUE',6X,'TOTAL',9X,'NET' 309
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     5  /'+',12('_')/' NO.    YEAR',2X,'FACILITIES',5X,'CAPITAL',6X,
     6'TOTAL',8X,'BENEFIT',3X,'EXPENSES   ',3X,'BENEFIT',8X,'FACTOR',2X,
     7'INVESTMENT',5X,'BENEFIT'
     8     /'+',   5('_'),1X,5('_'),3X,10('_'),2X,10('_'),2X,10('_'),
     94X,10('_'),2X,10('_'),2X,10('_'),7X, 7('_'),2X,10('_'),2X,10('_'))
      GO TO 3000
0173 453 WRITE(NPR,462)HEAD,INTRAT,MEASR1,MEASR2,MEASR1,MEASR2
0174 462 FORMAT (/ 2(30X,20A4/)  /28X,'ASSOCIATED RETURN ON TOTAL CAPITAL'
0175    1,F10.3,'  PERCENT'/'+',63X,9('_') //21X,'INVESTMENT (',2A4,')',
        214X,'ASSOCIATED EFFECTS (',2A4,')',22X,'PRESENT VALUES'/'+',14X,
        334('_'),4X,34('_'),16X,22('_')/          77X,'ASSOCIATED',7X,
        4 'PRESENT',15X,'ASSOCIATED'/4X,'PERIOD',19X,'WORKING',17X,
        5'ASSOCIATED',2X,'ASSOCIATED',5X,'NET',12X,'VALUE',5X,'TOTAL',
        Z9X,'NET'/'+',12('_')/3X,
        6'NO.   YEAR  FACILITIES',4X, 'CAPITAL',6X,'TOTAL',7X,'BENEFITS',
        76X,'COST',6X,'BENEFITS',9X'FACTOR',2X,'INVESTMENT',4X,'BENEFITS'/
        8     '+',   5('_'),1X,5('_'),3X,10('_'),2X,10('_'),2X,10('_'),
        94X,10('_'),2X,10('_'),2X,10('_'),7X, 7('_'),2X,10('_'),2X,10('_'))
      GO TO 3000
0176 454 WRITE(NPR,463)HEAD,INTRAT,MEASR1,MEASR2, MEASR1,MEASR2
0177 463 FORMAT (/ 2(30X,20A4/) / 32X,'SOCIAL RETURN ON TOTAL CAPITAL',
0178    1F10.3,' PERCENT',/'+',62X,9('_') //19X,'DIRECT INVESTMENT (',2A4,
        2')', 7X,'COMBINED TOTAL EFFECTS (',2A4,')',21X,'PRESENT VALUES'/
        Z '+',14X,34('_'),4X,34('_'),16X,22('_')/ 30X,'PROJECT',6X,'TOTAL',
        37X,'COMBINED',4X,'COMBINED',4X,'COMBINED',7X,'PRESENT',5X,'TOTAL'
        4,6X,'COMBINED' /4X,'PERIOD',7X,'PROJECT',
        56X,'WORKING',5X,'PROJECT',7X,'ANNUAL',6X,'ANNUAL',8X,'NET',10X,
        6'VALUE',5X,'PROJECT',8X,'NET'/'+',12('_')/3X,'NO.   YEAR',2X,'FACI
        7LITIES',5X,'CAPITAL',3X,'INVESTMENT',5X,'BENEFITS',5X,'COSTS  ',4X
        8,'BENEFITS',8X,'FACTOR',2X,'INVESTMENT',4X,'BENEFITS'/
        9     '+',   5('_'),1X,5('_'),3X,10('_'),3X, 9('_'),3X,10('_'),
        X3X,10('_'),2X,10('_'),2X,10('_'),7X, 7('_'),2X,10('_'),3X,10('_'))
      GO TO 3000
0179 455 WRITE(NPR,464)HEAD,INTRAT,MEASR1,MEASR2, MEASR1,MEASR2
0180 464 FORMAT(/ 2(30X,20A4/) / 27X,'COMPARATIVE RETURN ON TOTAL CAPITAL',
0181    1F10.3,'  PERCENT' /'+',63X,9('_') /94X,'PRESENT'/4X,'PERIOD',8X,
        2'COMPARATIVE OUTLAY (',2A4,')',9X,'COMPARATIVE COST   (',2A4,')',
        310X,'VALUE',8X,'PRESENT VALUES'/'+',11('_'),3X,34('_'),4X,34('_'),
        417X,22('_')/2X,'NO.    YEAR  ALTERNATIVE  BASE CASE  DIFFERENCE
        5 BASE CASE  ALTERNATIVE  DIFFERENCE',8X,'FACTOR',6X,'OUTLAY',
        65X,'SAVINGS'/
        7     '+',   5('_'),1X,5('_'),3X,11('_'),1X,10('_'),2X,10('_'),
        84X,10('_'),1X,11('_'),2X,10('_'),7X, 7('_'),4X, 8('_'),4X, 8('_'))
      GO TO 3000
0182 456 WRITE(NPR,465)HEAD,INTRAT,MEASR1,MEASR2, MEASR1,MEASR2
0183 465 FORMAT(/ 2(30X,20A4/) / 28X,'FINANCIAL RETURN ON EQUITY CAPITAL',
0184    1F10.3,'  PERCENT'/'+',63X,9('_') //19X,'EQUITY CAPITAL (',2A4,')',
        215X,'PROFIT AND LOSS (',2A4,')',9X,'PRESENT',6X,'PRESENT VALUES'/
        3'+',14X,34('_'),4X,34('_'),16X,22('_')/4X,'PERIOD',21X,
        4'FROM',22X,'TOTAL',5X,'OPERATING',7X,'NET', 9X,'VALUE',7X,
        Z'TOTAL',8X,'NET'/'+',12('_')/
        53X,'NO.    YEAR',3X,'PAID IN',5X,'EARNINGS',6X,'TOTAL',9X,
        6'INCOME',7X,'COST',7X,'PROFIT', 7X,'FACTOR',6X,'EQUITY',6X,
        7'PROFIT'/
        8     '+',   5('_'),1X,5('_'),3X,10('_'),2X,10('_'),2X,10('_'),
        94X,10('_'),2X,10('_'),2X,10('_'),7X, 7('_'),4X, 8('_'),4X, 8('_'))
      GO TO 3000
0185 457 WRITE(NPR,466)HEAD,INTRAT,MEASR1,MEASR2, MEASR1,MEASR2
0186
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0187          466 FORMAT(/ 2(30X,20A4/) / 42X,'ANNUAL DISCOUNT RATE',                  368
                 1F10.3,'  PERCENT' /'+',63X,9('_') /94X,'PRESENT'/4X,'PERIOD',8X,    369
                 2'COMPARATIVE OUTLAY (',2A4,')',11X,'COMPARATIVE COST (',2A4,')',    370
                 310X,'VALUE',7X,'PRESENT VALUES'/'+',11('_'),3X,34('_'),4X,34('_'),  371
                 416X,23('_')/2X,'NO.    YEAR  ALTERNATIVE  BASE CASE  DIFFERENCE     372
                 5  BASE CASE ALTERNATIVE    SAVINGS',9X,'FACTOR',3X,                 373
                 6'ALTERNATIVE',3X,'SAVINGS  '/                                      374
                 7      '+',   5('_'),1X,5('_'),3X,11('_'),2X, 9('_'),2X,10('_'),    375
                 84X,10('_'),1X,11('_'),2X,10('_'),7X, 7('_'),3X,11('_'),2X, 8('_'))  376
0188         3000 DO 1070 I=1,NOYR                                                    377
0189              IF(IRRW.EQ.5) OUT(I,2)= OUT(I,2)*(-1.0)                             378
0190              IF(IRRW.EQ.7) OUT(I,2)= OUT(I,2)*(-1.0)                             379
0191              WRITE(NPR,151)INO(I),IYR(I),(OUT(I,J),J=1,9)                        380
0192          151 FORMAT(1X,I4,3X,A4,4X,3(F9.0,3X),2X,3(F9.0,3X),F11.4, 2(3X,F9.0))   381
0193         1070 IF(ICARDS.EQ.1)WRITE(NPUNCH,155) INO(I),IYR(1),OUT(I,3),OUT(I,6)    382
0194          155 FORMAT (' ',I4,4X,A4,2F12.2)                                        383
0195              WRITE(NPR,152)(TOT(I),I=1,6),TOT(8),TOT(9)                          384
0196          152 FORMAT('+',15X,10('_'),2X,10('_'),2X,10('_'),4X,10('_'),2X,10('_')  385
                 1,2X,10('_'),16X,10('_'),2X,10('_')/7X,'TOTAL',4X,3(F9.0,3X),2X,     386
                 23(F9.0,3X),14X,2(F9.0,3X))                                         387
              C                                                                      388
              C       IX.  COMPUTE AND PRINT THE B/C RATIOS AND PRESENT VALUES       389
              C                                                                      390
0197              IF(IBC.EQ.0) GO TO 5000                                            391
0198              GO TO (471,472,473,474,475,476,477),IRRW                           392
0199          471 WRITE(NPR,6901)MEASR1, MEASR2                                      393
0200         6901 FORMAT(//  ' ',21X,'INTEREST',21X,'BENEFIT/COST',23X,              394
                 1'PRESENT VALUE IN ',2A4,/'+',85X,25('_')/' ',21X,'PER CENT',25X,    395
                 2'RATIO',23X,'REVENUE',4X,'OUTLAY',5X,'BALANCE'/'+',21X,8('_'),21X,  396
                 312('_'),19X,32('_') )                                              397
0201              GO TO 3299                                                         398
0202          472 WRITE(NPR,432)MEASR1,MEASR2                                        399
0203          432 FORMAT(//  ' ',21X,'INTEREST',21X,'BENEFIT/COST',23X,              400
                 1'PRESENT VALUE IN ',2A4,/'+',85X,25('_')/' ',21X,'PER CENT',25X,    401
                 2'RATIO',23X,'BENEFIT',4X,'OUTLAY',5X,'BALANCE'/'+',21X,8('_'),21X,  402
                 312('_'),19X,32('_') )                                              403
0204              GO TO 3299                                                         404
0205          473 WRITE (NPR,433)MEASR1,MEASR2                                       405
0206          433 FORMAT(//  ' ',21X,'INTEREST',18X,'ASSOCIATED BENEFIT',18X,        406
                 1'PRESENT VALUE IN ',2A4,/'+',83X,25('_')/' ',21X,'PER CENT',25X,    407
                 2'RATIO',17X,'ASSOC. BENEFITS',2X,'OUTLAY',5X,'BALANCE',/'+',21X,    408
                 38('_'),21X,12('_'),14X,37('_'))                                    409
0207              GO TO 3299                                                         410
0208          474 WRITE (NPR,434)MEASR1,MEASR2                                       411
0209          434 FORMAT(//  ' ',21X,'INTEREST',20X,'SOCIAL BENEFIT',21X,            412
                 1'PRESENT VALUE IN ',2A4,/'+',84X,25('_')/' ',21X,'PER CENT',25X,    413
                 2'RATIO',22X,'BENEFIT',5X,'OUTLAY',5X,'BALANCE'/'+',21X,8('_'),21X,  414
                 312('_'),19X,32('_') )                                              415
0210              GO TO 3299                                                         416
0211          475 WRITE(NPR,435)MEASR1,MEASR2                                        417
0212          435 FORMAT(//  ' ',21X,'INTEREST',22X,'COMPARATIVE', 23X,              418
                 1'PRESENT VALUE IN ',2A4,/'+',85X,25('_')/' ',21X,'PER CENT',25X,    419
                 2'RATIO',22X,'SAVINGS',5X,'OUTLAY',4X,'DIFFERENCE'/'+',21X,8('_'),   420
                 321X,12('_'),19X,32('_'))                                           421
0213              GO TO 3299                                                         422
0214          476 WRITE(NPR,436)MEASR1,MEASR2                                        423
0215          436 FORMAT(//  ' ',21X,'INTEREST',21X,'PROFITABILITY',20X,             424
                 1'PRESENT VALUE IN ',2A4,/'+',83X,25('_')/' ',21X,'PER CENT',25X,    425
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     2'RATIO',20X,'NET PROFIT',4X,'EQUITY',5X,'BALANCE'/'+',21X,8('_'),
     321X,13('_'),16X,33('_'))
0216       GO TO 3299
0217   477 WRITE(NPR,437)MEASR1,MEASR2
0218   437 FORMAT(//  ' ',20X,'ALTERNATIVE',20X,'COMPARATIVE',21X,
     1'PRESENT VALUE IN ',2A4,/'+',83X,25('_')/' ',18X,'ANNUAL RATE(%)'
     2,22X,'RATIO',20X,'BASE CASE',1X,'ALTERNATIVE',4X,'SAVINGS' /
     3 '+',18X,15('_'),10X,11('_'),17X,32('_') )
0219  3299 DO 1080 J=1,NDCR
0220       PVAL(J,2)=0.0
0221       PVAL(J,3)=0.0
0222       DIV=1./(1.+RATE(J))
0223       DO 1075 I=1,NOYR
0224       XI=I
0225       IF(OPTION.EQ.DICK)XI=DFLOAT(INO(1)+I)
0226       FACTOR=DIV**((XI-1.) / EFAC)
0227       IF(IRRW.LT.7) GO TO 1074
0228       OUT(I,3)=OUT(I,5) - OUT(I,1)
0229       OUT(I,6)=OUT(I,4) - OUT(I,2)
0230  1074 PVAL(J,2)=PVAL(J,2)+OUT(I,6)*FACTOR
0231       PVAL(J,3)=PVAL(J,3)+OUT(I,3)*FACTOR
0232  1075 CONTINUE
0233       PVAL(J,1)=PVAL(J,2)/PVAL(J,3)
0234       PVAL(J,4)=PVAL(J,2)-PVAL(J,3)
0235       ZRATE(J)=RATE(J)*100.0
0236  1080 CONTINUE
0237       WRITE(NPR,6902)(ZRATE(J),(PVAL(J,I),I=1,4),J=1,NDCR)
0238  6902 FORMAT(' ',20X,F7.3,25X,F7.3,19X,F10.0,2X,F9.0,2X,F10.0)
0239       IF (IRRW.EQ.3) GO TO 5001
0240       IF (IRRW.EQ.6) GO TO 5001
0241       IF (IRRW.EQ.7) GO TO 5001
     C--   WRITE(NPR,6904)
0242  6904 FORMAT(/ ' ',12('-'), /1X,'**EXCLUDING DEPRECIATION, INTEREST, AND
     1 INCOME TAX')
0243  5001 DUMMY = 0.
     C5001 IF(ISCALE.GT.0) WRITE(NPR,6905)(HEADJ (L), L=IPR4,IPR5)
     C--   IF (ISCALE.EQ.0) WRITE(NPR,6905) HEADK
0244       IF (ISCALE.GE.0) WRITE(NPR,6905)
0245  6905 FORMAT (/ ' ',   'ALTERNATIVE:  ', 20A4)
0246  5000 REWIND NST
     C
     C        X. RETURN TO THE NEXT SCALING OF PROBLEM OR TO THE NEXT PROB.
     C
0247       IF (ISCALE.NE.NSCALE) GO TO 55
0248       IF(IEND.NE.1)GO TO 1000
0249       WRITE(NPR,6903)
0250  6903 FORMAT('1  NORMAL TERMINATION OF PROGRAM.')
0251       STOP
0252       END
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0001                SUBROUTINE RRATE (FLOW,N,R,EFAC,INO,OPTION,DICK)                473
0002                IMPLICIT REAL*8(A-H,O-Z)                                        474
0003                DIMENSION FLOW(1)                                               475
0004                OSI=.10                                                         476
0005                DO 200 J=1,20                                                   477
0006                SNUMER=0.                                                       478
0007                SDENOM=0.                                                       479
0008                DO 100 I=1,N                                                    480
0009                II = I - 1                                                      481
0010                IF (OPTION.EQ.DICK) II = INO     + I - 1                        482
0011                TDIF = -DFLOAT(II) / EFAC                                       483
0012                TFACT=OSI*TDIF                                                  484
0013                IF(TFACT.GT.174.00) GO TO 201                                   485
0014                IF(TFACT.LT.-180.) TFACT=-180.                                  486
0015                PRSNTV=FLOW(I)*DEXP(TFACT)                                      487
0016                SNUMER=SNUMER+PRSNTV                                            488
0017          100   SDENOM=SDENOM+TDIF*PRSNTV                                       489
0018                RATIO=SNUMER/SDENOM                                             490
0019                SI=OSI-RATIO                                                    491
0020                IF(DABS(SI-OSI).LE..00005) GO TO 300                            492
0021                GO TO 200                                                       493
0022          201   SI=1.0                                                          494
0023          200   OSI=SI                                                          495
0024          300   R=(DEXP(SI)-1.0)*100.                                           496
0025                RETURN                                                          497
0026                END                                                             498
```